INTERNATIONAL ABSTRACTS OF SURGERY

VOLUME 87 DECEMBER, 1948 NUMBER 6

COLLECTIVE REVIEW

HISTORICAL ASPECTS OF PENETRATING WOUNDS OF THE ABDOMEN

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SINCE prehistoric times the abdominal cavity has been looked upon as one of the most vulnerable regions of the body, and injuries involving it have always been considered very serious. The lethal character of a wound which opened the abdomen was well known to the ancients. Not infrequently the military surgeons or, in their absence, the war chiefs or commanders serving as surgeons were required to remove arrows or spears implanted into the abdomen or, if these did not pass entirely through the cavity, to pull them through the opposite side. Usually unsuccessful efforts were exerted to remove inaccessible arrowheads from the cavity by the use of drawing plasters. The Ionian Greeks referred to the physician as the *ιητρος*, meaning "an extractor of arrows."

From the Homeric epics we learn of the death of Polydorus (13) at the hands of Achilles, whose weapon on entering the back of Priam's son made its exit in front, and the victim, "bending, clasped his bowels in his hands"; and while Tros (14) begged for his life, Achilles thrust

"His sword into his side; the liver came
Forth at the wound; the dark blood gushing filled
The Phrygian's bosom.....;"

We learn also of Eurymachus (16) who succumbed to the effects of a liver wound which was inflicted by an arrow from the powerful bow of Odysseus.

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Hippocrates (1) postulates that "a severe wound of the bladder....., of the small intestines, of the stomach, and of the liver is deadly." Xenophon (112), in his Anabasis, speaks of a Greek captain who after being wounded made his way back to camp holding his bowels in his hands. Every indication points to a number of abdominal wounds, among the twenty-three inflicted, suffered by Julius Caesar (15) at the hands of his numerous assassins.

Although murder by stabbing was chiefly superseded by poisoning during the Dark Ages, nevertheless, the dagger, arrow, lance, spear, and sword continued to account for many frequently fatal penetrating wounds of the abdomen. The "Age of the Despots" in Italy is replete with assassinations in which the dagger was usually the principal weapon used. Galeazzo Maria (103), Duke of Milan in 1476, died immediately as the result of almost simultaneous stab wounds of the back, chest, and abdomen.

The self-disembowelment of the Japanese, known as hara-kiri (26), is a vestige of old feudal Japan which has come down as a "national form of honorable suicide." After the preliminaries in the ritual the suicide plunges a dagger into the left side of his abdomen, below the costal margin, draws it slowly across to the right, and finally turns it up giving a sharp upward cut. This procedure is looked upon as wiping out all dishonor—a thought not foreign to our present day "Western" civilization—and probably a means of "facesaving," so important to the Japanese mental complex.

INTRODUCTION OF GUNPOWDER AND FIREARMS

Although 1354 is given as the year in which gunpowder was introduced in Europe by Schwartz (27), it is very likely that gunpowder was known to the Europeans long before this time, as powder works are described at Augsburg in 1340 and gunpowder was known in Florence as early as 1326. The early and very crude firearms, the first invention of which is attributed to Schwartz, no doubt appeared soon after the introduction of gunpowder. Certainly, at the battle of Cressy (84) in 1346, the bowmen were arranged in such a way as to have "small bombards between them which with fire threw little iron balls to frighten the horses." Louis XI of France (1477) "used bombards of great length and power, some with stone balls and some with iron." Wounds inflicted with such primitive firearms were very probably in the nature of bruises or contusions, very few possibly ever penetrating the surface of the body.

The pistol, which was the predecessor to the modern revolver and automatic, is said to have been invented in Pistoia, Italy, probably between 1475 and 1500. The revolver, an improvement over the two and three barreled pistols, made its appearance early in the seventeenth century; while the first automatic was introduced in 1893. Since the invention of these three weapons the greatest number of gunshot wounds of the abdomen in civilian life is traceable to them. The old musket and its descendants, the shotgun and rifle, as well as the highly efficient machine gun (so commonly used by gangsters in this country in the twenties and early thirties) are relatively infrequently used in civilian life as a means of assassination. In military undertakings today the revolver and automatic probably cause fewer abdominal injuries than the rifle, machine gun, hand grenades, shrapnel, splinters of shells and bombs, and fragments from other contrivances. Each new weapon introduced has been featured by an increased velocity of the missile used, and each has been devised for a more certain and greater destruction of the object struck. From all indications, therefore, probably very few, if any, penetrating abdominal gunshot injuries were seen before 1400, and since then they have not only been on the increase but the wounds inflicted have been of the more disastrous types—this in spite of an improvement lately reported in the mortality rate among the victims of these injuries (22, 23, 40, 47, 63, 80, 91, 93, 100).

The introduction of firearms made available a means of assassination in which the assailant was relatively free from the possibility of injury at the hands of the victim, an immunity which he did not fully enjoy in assassination by stabbing, especially if the intended victim was larger and stronger than the assailant. However, the introduction of firearms did not eliminate homicide by stabbing. Lances, swords, and daggers continued to enjoy their ancient popularity. Arrows with their bows became obsolete in Europe shortly after the invention of firearms. Spears very probably gave way to the bows and arrows many years before the introduction of gunpowder, and the dagger is still with us. Stab wounds today, however, are usually inflicted with large knives of various types or ice picks which have relatively recently become very popular. At the New Orleans Charity Hospital there were admitted—during the 15 years prior to January 1, 1942—478 cases of penetrating abdominal gunshot wounds, 85 per cent of which were due to revolver shots, and 330 cases of penetrating stab wounds of the abdomen, the majority of which were inflicted with various types of knives.

EARLY TREATMENT OF PENETRATING ABDOMINAL WOUNDS

The ancients usually washed all wounds carefully with warm water, after which they were examined more thoroughly. Wine was given as a stimulant. Spears and arrows were withdrawn or excised. The wound was treated further with oil or wine, or with root juices, and was protected with a woolen dressing. Certain herbs, known to relieve pain, were used freely, and the wounded were kept at rest in tents. Early in the Dark Ages there began the custom of using boiling oil and hot irons in the treatment of wounds. To these were added greasy salves and plasters. This abominable and barbarous treatment was finally stopped by Ambroise Paré (1510-1590) when he accidentally ran short of oil and thus discovered that other much less painful and less barbaric methods were not only more comfortable, but likewise more beneficial. In the treatment of gunshot wounds, which were becoming fairly common injuries by this time, Paré introduced the practice of searching for the ball, using "large and deep incisions" (43) if necessary.

That the problems connected with the proper management of penetrating abdominal wounds were difficult is attested to by the following recommendations by Jherome of Bruynswyke (12), who in 1525 taught:

"Whan the guttes is wounded ouertwhart or is in pecis, than it is dedly; yf it be lengthe woundyd, it may be holpen. If that the wounde of the belly is not grete inowgh, than shall ye make it greater

as I shall shewe you hereafter, than shall you take out proply the guttes, and sow it thereafter as it is needful with a skynners nedyll. Jamericus, Theodoricus, Rogerius lay elder pypes in the guttes under the seme, that the same rotte not. Whilhelmus and some other, lay there in a part of a cryer of a throte goll of a beest, as the IV maysters sayth. But Lanfrancus and Guido they thinke it not be profytable, for that nature is inclyned to outdrawynge strange thyngys, and thus yt helpt not therefore it was layd, and it is better that the guttes be sowyd, as afore is sayd, and that it be clensyd of the unclenes."

For very obvious reasons these recommendations were soon forgotten, and the treatment of penetrating wounds of the abdomen became very conservative. Hence, from about the middle of the sixteenth century to well on in the nineteenth century, when Sims and others began recommending intervention in cases of penetrating wounds of the abdomen—especially those caused by firearms—these injuries were treated by rest, opium, dressings, and protection of the wound, wine or brandy as stimulants, and frequent bleedings or venesections. Some feeding by mouth was at times allowed, but most usually small quantities of liquid foods were administered by rectum. In addition, Guthrie mentions the use of leeches, "fomentations to the belly," calomel, blistering of the abdomen, and "the judicious use of purgatives."

Venesections for bleeding, or the practice of bloodletting (as this procedure was more commonly known), and the extensive use of leeches about inflammatory areas, were therapeutic measures enjoying great popularity up to perhaps 100 years ago. After a rather lengthy dissertation Guthrie explains that....."when great inflammatory fever or inflammation come on, either of which is a great increase in action, the patient can bear it for several days without any permanent detriment, provided he lose blood in proportion to the increase of action, in order to prevent its destroying the texture or function of any vital part. If this be not done, the patient must be very soon carried off, because the action will increase so rapidly as to be soon incompatible with life, unless relief be obtained." The amount of blood to be removed usually depended upon the time that relief from pain occurred during the treatment by this bloodletting. Ordinarily the removal of from 12 to 25 ounces was recommended.

The practice of probing penetrating wounds very probably dates from antiquity. When firearms were improved to the point of producing penetrating wounds the attendants placed much importance on probing to remove the missile, if possible. Later, in addition to determining the location of the bullet for its possible removal, the probe was used to trace its course. In this way a more accurate diagnosis of the structures or viscera injured was considered likely. The use of the probe as a diagnostic instrument continued until the very early years of the present century, when the practice was condemned as dangerous.

Fig. 1. Ambroise Paré (1510–1590), "father of modern surgery" (at 75), who introduced many new practices in the military surgery of his time including the use of the ligature to control hemorrhage instead of hot oil and the cautery. ("Ambroise Paré and His Times, 1510–1590," by Stephen Paget. New York and London: G. P. Putnam's Sons, 1897.)

LATER TREATMENT

The ultraconservatism practiced in the management of penetrating abdominal injuries continued practically unchanged until Sims began emphasizing the need for laparotomy to repair the damaged structures in these cases, particularly in gunshot wounds. Prior to this, Baudens suggested "bold operations" in some cases of penetrating

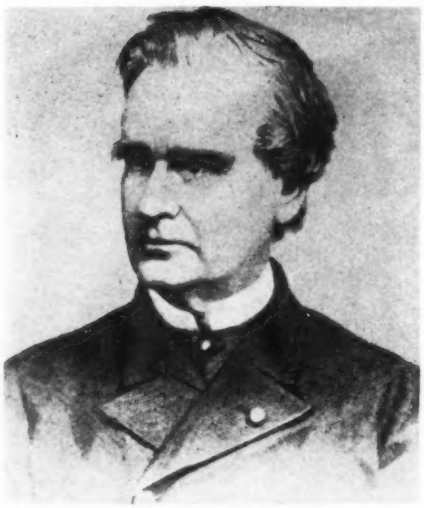

Fig. 2. James Marion Sims (1813–1883), American surgeon. Strong advocate of surgical intervention in penetrating gunshot wounds of the abdomen. ("Surgery of Modern Warfare" by Hamilton Bailey. Baltimore: The Williams and Wilkins Co., 1944.)

gunshot wounds of the abdomen, having performed enterorrhaphy in 2 cases of abdominal gunshot injuries during the French Algerian War, 1830 (98), after which one of his patients recovered. Baudens, accordingly, enjoys the distinction of probably having been the first to perform laparotomy for penetrating abdominal gunshot wounds. During the Crimean War this surgeon advised the introduction of the finger or a small sponge through the enlarged penetrating abdominal wound to determine the presence or absence of blood, feces, or bubbles of gas (67), in the absence of which he recommended abstention.

It was not very long before the views of Sims, the leader of the interventionist movement in the treatment of penetrating abdominal gunshot wounds, were upheld by many other surgeons, particularly in America and Germany. The leader of the abstentionist group, which was particularly strong in France, was Réclus (88), whose experiments on dogs and whose report of 66 recoveries in a series of 88 abdominal wounds treated conservatively, were especially convincing to his followers. He advised laparotomy only in those cases in which the signs of visceral injury were unmistakable. However, the writer believes that Réclus' convincingly favorable results were possible because of the much smaller caliber of the missiles used in the French guns of that day; whereas, the guns in America, Germany, and England were probably of a larger caliber and the bullets, therefore, very likely produced much more damage to the tissues involved.

A symposium on penetrating abdominal gunshot wounds, held by the American Surgical Association in May, 1887, concluded with the consensus of opinion in favor of the operative treatment, even in those cases in which the diagnosis of injury to important intraperitoneal structures was in doubt. At this meeting Nancrede's splendid paper covered the subject of laparotomy excellently. In spite of losing 2 of his 3 patients, it was his opinion that "the advantages of operation are manifold." On the same day, case reports by Kinloch, who is credited with having operated upon the first penetrating abdominal gunshot injury in this country, and by Keen, were followed by a general discussion, with additional illustrative case reports of penetrating gunshot and stab wounds by Conner, Gunn, Prince, Richardson (who reported from the New Orleans Charity Hospital), Agnew, (who had been a consultant in the gunshot wound case of President James A. Garfield), Dandridge, Ransohoff, and Roberts. In his paper, Kinloch quoted statistics by T.S.K. Morton, in which the latter (after a careful study of the world literature) gave reports of 57 cases operated upon for abdominal trauma up to that time (January 26, 1887). Among these there were 22 gunshot wound cases with 17 deaths, a mortality rate of 77.2 per cent. Kinloch further points out that Walter performed the first "abdominal section for traumatism" in America, followed by his first case in 1863. Walter's case was that of a 22-year-old blacksmith, who was kicked over the pubis while in a fight. Because of excruciating pain exploration was advised. This was done in January, 1859, several days after the fight. A urinary bladder laceration 2 inches long was found. Urine and blood were removed from the peritoneal cavity. A retention catheter was placed in the bladder and kept there 3 weeks. The patient recovered.

In an editorial entitled "Laparotomy in Gunshot Wounds of the Abdomen" (24), appearing in the Journal of the American Medical Association on January 12, 1889, the subject was reviewed very thoroughly and the opinions of the various writers of that day were given. After consideration of the recommendations of Réclus, in which the noted French surgeon advised: (1) firm compression of the abdomen to check hemorrhage and fecal extravasation, (2) administration of large doses of opium, and (3), failing in this, laparotomy—the editorial concluded by giving the impression that its writer was in total disagreement

with Réclus on several points, and took the stand that intervention is almost invariably to be preferred to passive treatment in these cases.

Despite the trend of surgical opinion in America, the results, following the adoption of the active or operative treatment, were for many years practically no better than those following conservative treatment. Thus, in 1889 Barrow reported laparotomy in 4 cases with 1 recovery—a case in which no visceral nor other important structural injuries were found. Somewhat prior to this, Morton reported a mortality rate of 77.2 per cent. The tendency toward intervention was so convincing, however, that at the start of the Boer War (32) (1899-1902) the British advised laparotomy in all cases of penetrating abdominal wounds when there was reason to believe intestinal injury existed. However, a study of the results shortly after the onset of hostilities showed that the mortality was greatest among the patients treated by laparotomy. Accordingly, during the remainder of the war, conservatism was the order of the day. This British military order remained in force through the early months of the first World War, not being rescinded until 1915, at which time a study of the cases of penetrating abdominal wounds showed the need for intervention. It is believed that a smaller type of bullet used by the Boers in the South African War obviated the need for laparotomy in many cases of intestinal perforation, inasmuch as the small openings produced were easily closed by the intestinal mucous membrane. However, during World War I the larger missiles, as well as a greater and more damaging variety of them, produced larger perforations and more extensive lacerations. These necessitated intervention if there was to be any hope of recovery.

During the Russo-Japanese War (1904-05) the policy of conservatism was soon replaced by one of intervention following the innovation by Princess Gedroitz (32), who "organized and equipped a railway carriage operating unit in such proximity to the battle front that it was possible to operate on penetrating abdominal wounds within a period of three or four hours of their being sustained." The Russian Army authorities were in this way convinced of the great importance of time in these cases and advised continuation of this practice.

Thus, the interesting indecision on the part of the Surgical World, as regards active or passive treatment in penetrating wounds of the abdomen, continued for 55 years. Early in the first World War the mortality in these cases was frightful. This represented the period of nonintervention in this conflict. Later, however, when the victims were treated and operated upon in the clearing stations nearer the front, the mortality dropped to around 56 per cent (108).

Fig. 3. Paul Réclus (1847–1914) French surgeon. Leader of the abstentionist group in the treatment of abdominal gunshot wounds. ("Surgery of Modern Warfare" by Hamilton Bailey. Baltimore: The Williams and Wilkins Co., 1944.)

Although the matter of active or passive treatment in penetrating abdominal wounds occupied the attention of, and appeared to be of paramount importance to, surgeons for many years, not much was otherwise done in the management of these cases. Infusions of saline solution and glucose, although known, were rather infrequently used before the present century. The Matas (71) continuous intravenous drip of glucose, like the ordinary infusions of saline solution (68) and glucose, has only relatively recently been used in these cases of trauma. These procedures have proved to be indispensable adjuvants in the treatment of patients with penetrating wounds of the abdomen.

As regards the operability or fitness of a patient with a penetrating abdominal gunshot wound for exploratory celiotomy, the rule taught by Matas (70) to his military classes in 1916 to 1918, at the New Orleans Charity Hospital, very probably applies as well today as it did then, except that blood and especially plasma transfusions are now easily substituted for the saline-glucose-adrenaline continuous intravenous drip which was then used. His rule was that no surgical exploration should be undertaken until the patient shows signs of having reacted from shock.

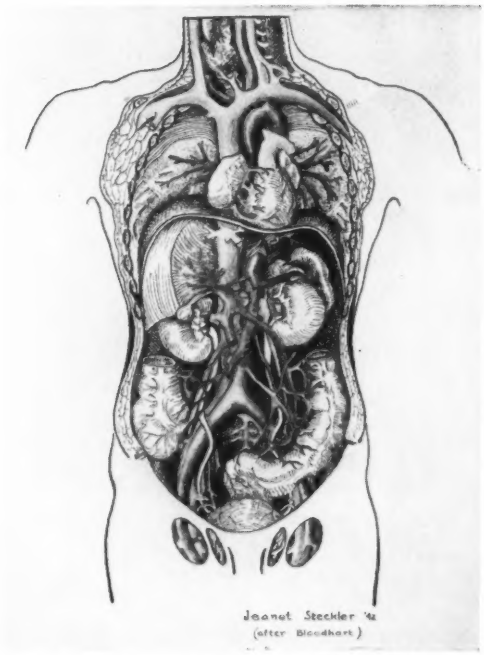

Fig. 4. Diagrammatic sketch emphasizing the location of the large intrathoracic and intra-abdominal blood vessels, injury to any of which may result in sudden death.

In all cases of penetrating gunshot wounds in which the patients were brought to the hospital "in a state of collapse from shock or hemorrhage, or both," the first step was to deal immediately with the collapse by using the continuous saline-glucose-adrenaline intravenous drip, which Matas first introduced in New Orleans in 1910 as an improvement over the massive repeated infusions (which were likewise first used by him in New Orleans in 1888), and as a substitute for the uncertainties of the Murphy rectal saline drip which had been in vogue in abdominal practice since the beginning of the century. While the intravenous drip was in progress, the usual other measures in the treatment of shock and collapse were applied, and all preparations were made for the exploration. However, no incision was made until the patient showed signs of cardiovascular reaction to the stimulating and resuscitating effects of the warm saline-glucose-adrenaline drip infusion. With the first signs of returning animation, as shown by the color, temperature, pulse rate, blood pressure, consciousness, and pupillary reactions, the exploration was immediately undertaken in the effort to control hemorrhage as the first indication. If the patient failed to react to the intravenous infusion, operation was considered useless "as shock was the preponderating feature of the collapse, and any added trauma would certainly precipitate a fatal issue on the operating table."

In the cases showing hemorrhage as "the dominant feature of the collapse, the pulse and general condition would improve with the increasing blood volume supplied by the infusion, and an exploration could then be performed while the drip was going on, with the expectation at least of survival of the patient from the operation."

The first use of a blood transfusion in penetrating abdominal gunshot wounds is credited to Fonio in 1918, although he ascribes priority to Agote. The use of transfusions in abdominal trauma has saved many lives which would have certainly been lost previously. For a good many years, the problem of securing donors (60) as quickly as needed interfered materially with this form of therapy. The recent introduction of blood plasma for intravenous use in the treatment of shock and hemorrhage, and the establishment of plasma banks in most modern hospitals, has helped very considerably to solve this problem. At present, therefore, with the liberal supply of blood, whole or citrated, and blood plasma, all of which are usually on hand in every modernly equipped hospital, the stimulating and resuscitating effects of the transfusion are far more quickly perceptible than when simple artificial sera are used, particularly if the blood transfusion is kept up as a continuous intravenous drip of indefinite duration, sufficient at least to compensate for the volume of blood lost. If a patient on the operating table is too deeply shocked to respond to this fundamental mode of cardiovascular stimulation, an operative procedure will not only fail to save the victim but will more than likely precipitate the end. Thus, today, in addition to undergoing laparotomy, almost routinely in these cases, the victim receives the benefits of prompt and adequate preoperative preparation, postoperative care, especially as regards the replenishment of fluids, electrolytes, plasma, and blood, the all important vitamin therapy, so essential in convalescence, and, lately, the benefits of chemotherapy (63) (93) (46) which appears to help very materially in reducing the mortality among these victims.

In connection with the preoperative and postoperative care of these patients, too, the continuous drainage of the gastrointestinal contents by siphonage through an indwelling gastroduodenal tube, introduced by the nasal route, has proved

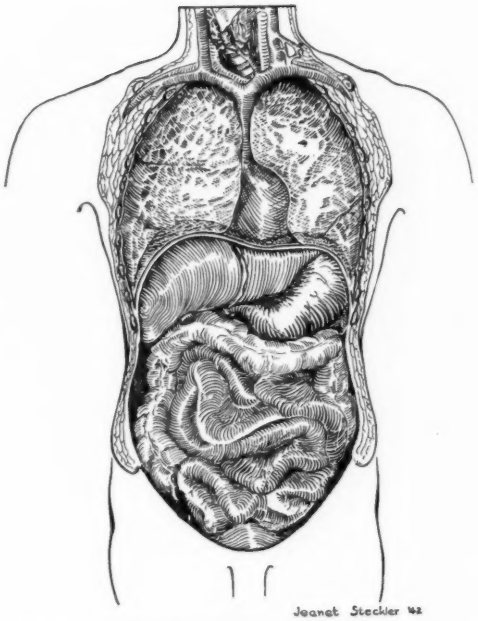

Fig. 5. Diagrammatic sketch emphasizing the relationship of the relatively more superficial anterior structures of the chest and abdominal cavities.

Fig. 6. Diagrammatic sketch emphasizing the positions of the retroperitoneal structures and the peritoneal cavity. Kidneys, ureters, adrenals, and duodenum are the structures more frequently injured, especially by penetrating abdominal gunshot wounds.

to be very valuable and indispensable. Nothing else in the surgeon's armamentarium is as effective in controlling vomiting and tympanites. Probably no other advance has contributed more materially to the comfort of these patients than this procedure, which was first introduced in the New Orleans Charity Hospital, simultaneously with continuous intravenous drip, by Matas in 1911 (71) in the treatment of intestinal obstruction. This same procedure, modified in 1931 (107) by the use of a suction apparatus for simple siphonage, is now known as the Wangensteen suction.

DIAGNOSIS IN ABDOMINAL TRAUMA

The introduction of the operative method of treating abdominal trauma, particularly penetrating wounds of this cavity, by Baudens in 1830, automatically created a great need for a more careful and more accurate diagnosis in all cases of trauma to the abdomen. For many years, the probe was one of the most important instruments in the surgeon's armamentarium. With it the course of a penetrating missile could more or less be traced. The use of this instrument as a diagnostic measure was considered good practice until early in the present century, when many of its dangers were emphasized and its popularity consequently faded. Because of their conspicuousness, the entrance and exit points in penetrating or perforating wounds of the abdomen attracted attention from the earliest days. Extensive stab wounds, especially those in which the weapon perforating the cavity showed itself on the opposite side, were easy to diagnose with respect to involvement of the abdomen. Smaller stab wounds were more difficult to diagnose as regards involvement of the cavity and its contents. It was in this type particularly that the probe was of much help to the diagnostician.

The introduction of firearms made the use of entrance points more difficult to understand. The early types of firearms did not propel the missile with a very great velocity. Not infrequently, removal of a piece of shirt or other clothing from a wound brought the bullet out along with it. Later, as the velocity of the missile increased this seldom happened. However, usually the course of the bullet was very difficult to trace after it had entered the cavity. An exit point would sometimes simplify the diagnosis. Frequently, how-

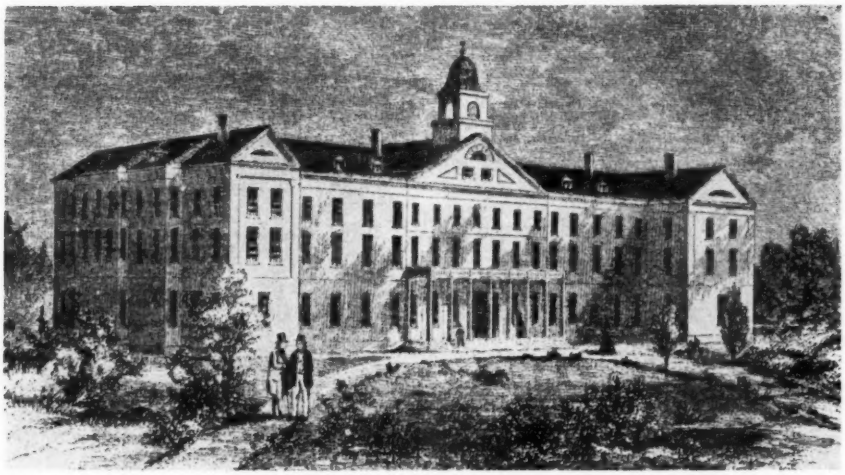

Fig. 7. Charity Hospital of Louisiana at New Orleans in 1859. This structure was only relatively recently demolished to clear the ground for the present skyscraper building.

ever, exit points are not present. Occasionally, because of ricocheting when striking tissues of varying densities, the missile takes a more tortuous course than is expected, and when the peritoneal cavity is suspected of being almost certainly involved it is found not to be. On the other hand, when no involvement is suspected the danger signs of some serious injury to important structures frequently follow. In general, however, the presence of entrance and exit points gives a fairly accurate idea of the course of a bullet and the structures possibly injured.

As pointed out by Baudens, when a sponge on a holder is passed through a small opening into the abdomen, the finding of free blood, feces, or bubbling gas in the peritoneal cavity is unmistakable evidence of injury to a blood vessel or the intestines. However, evidence of this type is unusual, especially in abdominal penetrating wounds observed among civilians. Of great importance, too, but not infrequently misleading, are abdominal pain, nausea, and vomiting. This triad is very important, and usually points to visceral injury within the peritoneal cavity. A silent abdomen, on auscultation, is usually indicative of intestinal perforation. Pallor, a rapid pulse, thirst, and profuse perspiration point very strongly to possible active internal hemorrhage. Since the largest number of the patients die of hemorrhage (60), early diagnosis of this condition is most important. Every patient with abdominal trauma should be made to void or, if necessary, catheterized for the possible presence of blood in the urine. If indicated, a digital and proctoscopic examination of the rectum should also be done.

An important method of diagnosis, introduced by Lenk during the first World War, was the use of the fluoroscope for air under the diaphragm. The use of the x-rays to locate a missile, as pointed out by Granger, is likewise of value, since the course of a missile might frequently be reconstructed when it is properly located in the body. The recent use of the peritoneoscope by Hamilton in "gunshot and stab wounds of the abdomen of doubtful penetration" has added another diagnostic method that may prove to be of value in the future. The great importance of a correct preoperative diagnosis in these cases was universally appreciated during the recently ended World War II. Michels is of the opinion that this helps to explain the "superior" results thus obtained among these cases.

NEW ORLEANS CHARITY HOSPITAL

After a careful study of penetrating gunshot and stab wounds of the abdomen in patients admitted to the Charity Hospital of Louisiana at New Orleans, the author agrees with Matas (72) that, aside from an actual seat of war, possibly no other hospital in the world sees and treats as many cases of penetrating abdominal injuries as does this great medical institution. From January 1, 1927 to January 1, 1948, this hospital has admitted 1,352 cases of penetrating abdominal gunshot

Fig. 8. Charity Hospital of Louisiana at New Orleans as it appears today.

and stab wounds, 685 of which were gunshot injuries. During this same time, 1,369 cases of penetrating gunshot and stab wounds of the chest were admitted, 968 of which were stab injuries. Thus, over a period of 21 years this institution has admitted 2,721 cases of penetrating gunshot and stab wounds involving the chest, abdomen, or both of these cavities.

This unenviable reputation quite naturally reflects the activities and tendencies of a section of the country in which a large proportion of the population are negroes. Accordingly, among the 2,721 patients 2081, or 76.5 per cent, belonged to this race. Among the abdominal cases 69.2 per cent occurred in negroes. Hence, the unusually large number of such cases seen at this institution is in great part due to the large negro population of this section.

The experiences at this hospital with these types of cases no doubt date back to its founding in 1832. Thus far, however, the first published record the writer has been able to find is a discussion by Richardson, Professor of Surgery in the Medical Department of the University of Louisiana (Tulane), of a symposium on abdominal gunshot wounds held by the American Surgical Association in May, 1887. In his discussion, Richardson said that "a large proportion of cases of penetrating wounds of the abdomen get well without laparotomy" at the New Orleans Charity Hospital, and further stated that during the previous 5 years (1882-1887), of the 31 patients admitted with knife wounds of the abdomen, 24 recovered, and of the 33 with gunshot wounds involving this cavity, 13 recovered. Additional studies and contributions on this subject from this institution were later made by Miles, to whom Matas (72) gives credit for inaugurating the operative treatment of these

TABLE I.—SOCIOLOGIC ASPECTS OF VIOLENCE AMONG THE VICTIMS OF GUNSHOT AND STAB WOUNDS ADMITTED TO THE NEW ORLEANS CHARITY HOSPITAL FROM JANUARY 1, 1900 TO JANUARY 1, 1942.

Type of Wounds	Total	Cases		Incidence Per cent
		White	Colored	
Penetrating gunshot and stab wounds of abdomen	2,774	665	2,109	8.7
Penetrating gunshot and stab wounds of chest	3,640	659	2,981	11.5
Nonpenetrating gunshot and stab wounds of abdomen	1,567	388	1,179	4.9
Nonpenetrating gunshot and stab wounds of chest	2,538	630	1,908	7.9
Extra-abdominal and extra-thoracic penetrating gunshot and stab wounds (head, neck)	21,232	7,417	13,815	66.8
Totals	31,751	9,759	21,992	69.2 colored 30.8 white
Cases Average yearly.....756 Average monthly.... 63 Average daily..... 2.2				

These figures do not include other types of violence, as injuries with blunt weapons (hammer, iron bars, clubs), poisoning, nor does this include vehicular injuries.

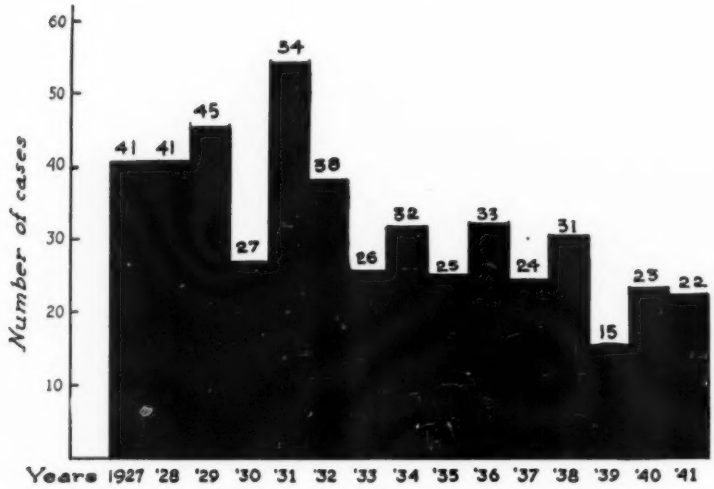

Fig. 9. Sociologic aspects of penetrating abdominal gunshot wounds in a recent series of 478 cases admitted to the New Orleans Charity Hospital from January 1, 1927 to January 1, 1942. The apparent decline in admissions during 1939, 1940, and 1941 may be due to the increased number of men between the ages of 20 and 40 being drafted into the Armed Forces during these years.

wounds at the Charity Hospital, Parker, and Fenner, Shands, Allen, Crawford, with relatively recent contributions by Loria (58, 59, 60, 61, 63), Miller, and Storck (101), the latter two reporting on their personal cases.

In this connection, the writer is pleased to express his sincere and very grateful appreciation of the opportunities and encouragement for the study of abdominal gunshot wounds that he has derived from his honored chief, teacher, and friend, Professor Rudolph Matas. It was while serving as clinical assistant on Professor Matas' staff at the Charity Hospital—during the time the writer had the privilege and honor of serving his surgical apprenticeship under him— that he was impressed with the importance of further study in this field of traumatic surgery. In 1925, the Charity Hospital Surgical Staff appointed a committee for the study of gunshot wounds of the abdomen. Dr. Matas was named Chairman of this Committee. All cases of abdominal gunshot wounds admitted to the institution during the years 1925 and 1926 were observed and carefully studied by the writer and yearly reports were made by the Chairman to the Surgical Staff (69). It was the study of these cases and the statistical work done during this time under Professor Matas' direction that have served as a foundation for the writer's later contributions on this subject.

Dr. Matas, assisted by Mr. Edward Hynes (72), was the first, in 1901, to utilize the collective Charity Hospital statistics for comparative racial incidence and mortality of abdominal gunshot wounds in relation to the population, and in comparison with other general hospitals of the same type in the United States and Canada, taking the statistics of the hospital in the decennium from 1890 to 1900 for this purpose. They found that the general State hospitals of the same type in New York, Boston, Philadelphia, Cincinnati, St. Louis, and Montreal had admitted a total of 205 cases of gunshot wounds of the abdomen during the decennium considered, while the Charity Hospital had admitted and treated 234 cases during the same period. It is interesting to note that among the 122 patients operated upon in this Charity Hospital series, there were 84 fatalities, a mortality rate of 68.9 per cent, whereas, among the 112 nonoperative patients, there were 60 deaths, a mortality rate of 53.6 per cent (69).

Recent studies by the writer (61, 63) of all cases admitted to this institution from January 1, 1927 to 1948 have revealed an enviable wealth of material, the analysis of which is still far from being complete. From January 1, 1900 to January 1, 1948, a total of 1,678 patients with penetrating abdominal gunshot wounds have been admitted to this institution for treatment. By adding the

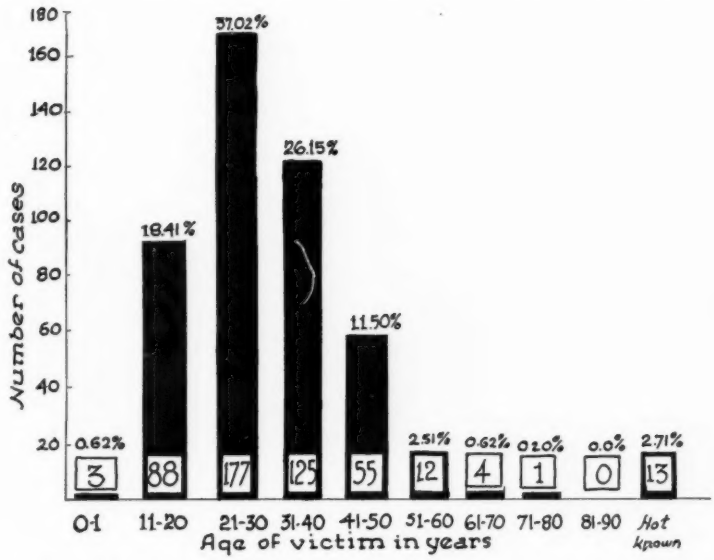

Fig. 10. Age incidence in the recently studied 478 cases of penetrating abdominal gunshot wounds at the New Orleans Charity Hospital. It will be seen that the greatest number of victims are between 20 and 40 years of age—nearly two-thirds.

234 patients admitted from 1890 to 1900, as reported by Matas (72), we find a total of 1,912 patients with penetrating abdominal gunshot wounds treated at the New Orleans Charity Hospital over a period of 58 years—an average of about 33 cases each year. Recent studies on penetrating stab wounds of the abdomen show that 1,439 patients were admitted to this institution from January 1, 1900 to January 1, 1948. Hence, over a period of 48 years, 3,117 patients with penetrating gunshot and stab wounds of the abdomen have been admitted to this hospital for treatment, an average of 65 each year, or 1 nearly every 6 days. It is not surprising then, that Lagarde (72), during World War I, "jokingly suggested that the students in the Army Medical School should come to the Charity Hospital for part of their military training."

THE LATE SPANISH CIVIL WAR

A brief review of the literature dealing with this type of injury during the late Spanish Civil War is of particular interest mainly because of the appalling and frightful mortality rates reported (6, 48, 96) by the surgeons on each side. Sevilla summarized the experiences on the six most important sectors or battle fronts in the campaigns of the army under General Francisco Franco. The lowest mortality rate reported by him, 53.7 per cent, occurred among patients treated on the Northern Front. The highest mortality, 71.8 per cent, occurred in the Teruel Sector. Baron, too, reported mortality rates between 53 and 75 per cent for this type of injury. The figures reported by Jolly for this type of wound are no more encouraging.

Especially interesting is Jolly's observation that "the majority of cases can be classified into three clinical groups." According to him these three groups depend upon the signs and symptoms which indicate predominantly: (1) an appreciable blood loss by the victim, (2) evidence of perforation of the gastrointestinal tract, or (3) evidence "in which the dominating injury appears to be to the sympathetic ganglia and plexuses in the upper retroperitoneal region."

In discussing the prognostic factors Jolly emphasizes: (1) the time lag, (2) the type of projectile, (3) the physical condition of the wounded man before the injury, (4) the site and direction of the wound, (5) the organ or organs affected, (6) the conditions under which the operation takes place, and (7) the possibilities for blood transfusion, as "useful guides." According to Trueta the Spanish Civil War contributed "one development which is now universally accepted

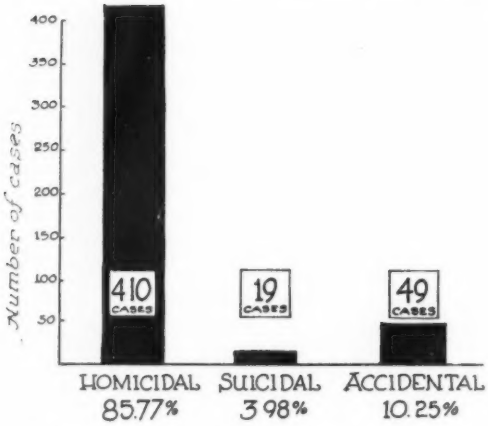

Fig. 11. Criminal status of the recently studied 478 cases of penetrating abdominal gunshot wounds at the New Orleans Charity Hospital. As noted the violence among these victims is predominantly homicidal.

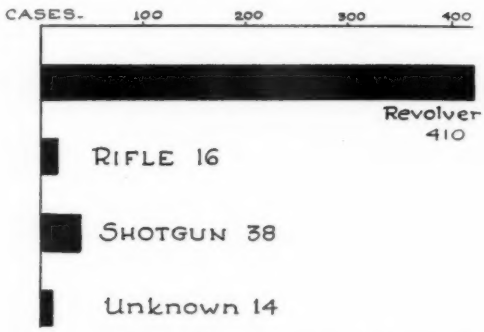

Fig. 12. Type of weapon. The revolver and automatic were by far the weapons of choice by the assailants among the 478 victims of penetrating abdominal gunshot wounds recently studied at the New Orleans Charity Hospital.

TABLE II.—CAUSES OF DEATH AMONG THE 478 CASES OF PENETRATING ABDOMINAL GUNSHOT WOUNDS RECENTLY STUDIED AT THE NEW ORLEANS CHARITY HOSPITAL. THE ANALYSIS SHOWS THE CAUSES OF DEATH IN RELATIONSHIP TO THE TYPE OF HEMORRHAGE AMONG THESE FATAL CASES.

Causes	Slight	Hemorrhage		Undetermined
		Moderate	Massive	
Hemorrhage and shock	0	7	142	0
General peritonitis and septicemia	13	41	49	2
Cystitis and pyelonephritis	0	1	1	1
Pneumonia	2	10	11	2
Septicemia and exhaustion	3	2	1	0
Gas gangrene, abdominal wall	1	0	1	0
Spinal cord injury	2	0	1	0
Subphrenic abscess	1	0	0	0
Liver abscess, traumatic	0	0	1	0
Coronary thrombosis	0	0	1	0
Gangrene, transverse colon	0	1	0	0
Hemopericardium	0	0	1	0
Gangrene, urinary bladder	0	1	0	0
Retroperitoneal abscess	0	0	1	0
Gangrene, lung (left)	0	0	1	0

as part of the surgical treatment of war casualties," and that is the collection, proper storage, and dispatch of blood donated by the civilian population for use in the combat areas. The Republican Army Medical Corps used "small medical units in the field" as transfusion teams, whereas in Franco's armies the transfusions were usually given at "fully equipped medical centers in the rear." The newly introduced sulfonamides were first used in 1937 (104) in some cases of seriously infected war wounds. Jolly mentions nothing about the use of the sulfonamides in cases of abdominal wounds.

Jolly states that "to-day there can be no excuse" for conservative treatment of abdominal gunshot injuries. Surgical intervention is therefore advised in all cases except (1) the ones in which general peritonitis is well advanced, (2) those failing to show evidence of hollow viscus perforation and in which there is not enough blood loss to endanger life, (3) "moribund cases," and (4) those cases in which there are additional wounds that are obviously incompatible with life. He says further that a "blood transfusion should be started just before operation" in these cases. Ether is considered the anesthetic of choice "when gas and oxygen are not available."

In his discussion of the operative treatment of this type of case Jolly emphasizes the importance of systematic exploration. He cautions that unless this is done "lesions will be missed." It is advised that if the lesion is predominantly hemorrhagic the bleeding point or points should be found as soon as possible, and "the liver, spleen, mesentery, and posterior abdominal wall should be examined in that order." When the injury or injuries are predominantly perforations of the hol-

low viscera each lesion should be marked with a suitable (Poirier) forceps and the search continued for other lesions. After one is satisfied that no other injuries are present repair is done in a systematic fashion. By following this plan, valuable time is saved.

Of interest in this connection is Jolly's recommendation that "resection of the colon" should be done in those cases of large bowel injury showing "larger tears and retroperitoneal wounds" of the fixed portion of the colon. This should be done, he says, "notwithstanding the appalling mortality rate."

The treatment of injuries to the rectum depends upon whether the wounds are extraperitoneal or intraperitoneal. The latter are the most serious and are usually attended by a higher mortality rate. The former are managed by primary removal of the coccyx and sometimes, too, of a portion of the sacrum. However, it is further advised that if such an extensive operation is done for repair of injuries to the rectum, it will be "unsatisfactory unless a colostomy is performed at the same time."

Liver wounds, which varied in type and severity, were treated according to the exigencies of the case. When it was believed certain that there was no injury to the hollow viscera they were treated conservatively. However, if injury to a hollow viscus could not be excluded, or if there was any doubt at all regarding this matter, celiotomy was considered to be mandatory. Large liver lacerations were packed. Smaller fissure wounds were sutured with deep mattress sutures of catgut, "a fringe of the omentum" being "introduced into the lips of the crater" before tying.

Unless wounds of the spleen were very trivial and not bleeding, removal was considered the procedure of choice. Jolly is of the opinion that wounds of the pancreas are "nearly always fatal." It is his further opinion that "these lesions are seldom seen, or seldom found." Except for drainage used in cases of injury to the pancreas, "drainage of the abdominal cavity should be abandoned for gunshot wounds of the abdomen."

In the discussion of the postoperative care of cases of abdominal gunshot injuries Jolly emphasized the importance of morphine, the giving of small quantities of fluids by mouth, and the establishment and maintenance of a proper fluid balance. In this regard, it is his feeling that had it been possible to use the "Abbot jejunoileal tube" for decompression of these cases during the Spanish Civil War more lives might have been saved.

Although Jolly gives an incidence of 11 per cent in abdominothoracic wounds, his "series does not include casualties in which bullet wounds obviously affected the abdominal cavity, but in which, because only the liver was affected and hemorrhage did not threaten life, operation was not called for." Inclusion of these cases would have undoubtedly increased the incidence of this special type of case. The management of this type of wound introduced special problems, and the choice of abdominal, thoracic, or combined abdominothoracic approach for the operation in these cases depended upon the special problems presented.

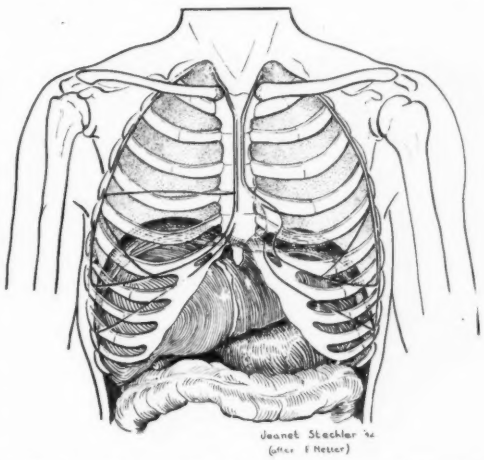

Fig. 13. Diagrammatic sketch showing the relationship of adjacent abdominothoracic structures, and why penetrating wounds of the abdomen or chest at proper levels frequently involve both cavities.

EXPERIENCES DURING WORLD WAR II

The usual general interest in the surgery of abdominal trauma is always considerably intensified during wartime. Hence, the appearance in the literature of more than 359 articles on abdominal gunshot injuries—only one of the many types of injuries involving this cavity—from January, 1940 to June, 1946, inclusive, is not by any means unexpected. Although some of these contributions have come from civilian sources, an increasing number represents the studies, personal experiences, and observations of a large number of surgeons serving in the Armed Forces during the recent second World War.

The various phases and aspects of the abdominal injuries of warfare, including their complications, were rather thoroughly considered at the start of the second World War, by (1) the Committee on Surgery of the Division of Medical

Sciences of the National Research Council, whose contribution on "Abdominal Injuries" was prepared by Storck (102), by (2) Davis, Heyd, Gordon-Taylor (38), and Fulton, and by (3) Fraser (33) (34) (35), Charles, Gordon-Taylor (39), Gordon-Watson and Morgan, and McFadden and Galloway. The first of these contributions represents the official manual of the United States Armed Forces on the management of abdominal wounds. The second group, nearly all by Americans, comprises outstanding authorities on the subjects discussed, whose individual contributions are grouped in one volume entitled "War Medicine." The third is by a group of British authorities whose respective contributions appear in the "Surgery of Modern Warfare" edited by Hamilton Bailey. As the War progressed these contributions were supplemented by bulletins on abdominal injuries issued by the War Offices of America and Britain from time to time. Because of its interesting aspects, one such bulletin is quoted in full at the end of this section.

Most writers on this subject have a distinct appreciation of the lethal character of abdominal gunshot wounds. However, the frightful realities of penetrating abdominal wounds, especially as they apply to modern total warfare, have never been sufficiently emphasized to make us appreciate the true and full significance of this type of injury. Goetze (1929) is quoted by Baron as saying that theoretically we may say that under optimum conditions of surgical technique and transportation, in warfare, it is possible to save from 25 to 30 per cent of the patients with penetrating wounds of the abdomen who would be doomed to certain death without operation. In his analysis of this problem, Baron continues by saying that "when we face the cruel realities of World War I, as they apply to our (Spanish) experiences, we see that while it is true that from 1,850 to 3,700 abdominally stricken soldiers owe their lives to timely surgery by celiotomy, we also realize the relative insignificance of our contribution when we find that the deaths of 10 per cent of the 1,185,000 soldiers killed outright on the battle fields of World War I were caused by the shock and hemorrhage of penetrating abdominal wounds!" On the strength of this statement, therefore, 118,500 soldiers, victims of penetrating abdominal gunshot wounds on the fields of battle during the first World War, died before any surgical help could possibly reach them. This is indeed a very gloomy and challenging revelation. However, the encouraging reports that have come in from the recent (second) World War make it appear that the improved transportation facilities and the improved methods of management generally have cut the mortality figures down rather appreciably.

Most observers during the recent World War II seem to agree that the splendid improvement in the mortality rate (23, 47, 93, 80, 100) of abdominal gunshot injuries is largely explained by three factors: (1) the free availability of large quantities of plasma and blood for resuscitation and the treatment of shock (10, 25, 47, 93), (2) the judicious use of chemotherapeutic agents—the sulfa drugs at first and later the antibiotic penicillin (4, 46, 65), and (3) improved surgical methods and techniques. To these one should undoubtedly add the improved facilities for the preoperative and postoperative treatment in these cases, many of which were already in civilian use before the War. Hence, the improved method of gastrointestinal drainage, the availability of the Miller-Abbott tube, a better understanding of the importance of a proper fluid and electrolyte balance, and other advances and improvements in the management of the surgical patient, practically none of which were available to the surgeon in the first World War, undoubtedly had much to do with the great decrease in the mortality rate among the abdominally injured in World War II. In addition, the presence of many well trained and qualified anesthetists to supervise the administration of anesthetics to these patients at all hospitals, unquestionably also had much to do with the increased recovery rates reported (23, 47, 80, 85, 93, 100).

Another factor of great importance in cutting down the mortality rate from the previous usually high figures was the great care taken by the surgeon in attempting to establish a more precise preoperative diagnosis in these cases (75). At no time in the past has this type of injury been so diligently and thoroughly studied as during the recently ended conflict. Every conceivable factor and possibility were given the greatest consideration in an effort to reduce the mortality rate among the victims of abdominal injuries. As a result, such problems as abdominothoracic gunshot injuries, air blast injuries, water blast injuries, and injuries to the extraperitoneal structures—especially the kidneys and extraperitoneal portion of the rectum—were understood better and treated with more success than at any previous time.

Because two very important cavities are involved in abdominothoracic gunshot wounds, there is always doubt as regards the seriousness of the abdominal or thoracic injuries. Even after careful study and consideration, the surgeon is often in doubt as to whether he should open the chest,

the abdomen, or both. The special difficulties usually encountered in this kind of injury are well discussed by Gordon-Taylor and others (38, 48, 61). Studies by these writers give the impression that the mortality rate among such cases is greater than among the cases in which the abdomen alone is involved. In general the mortality rate among victims of abdominothoracic gunshot wounds depends upon the organs or structures damaged, the extent of the injuries, and the condition of the victim when injured.

BLAST INJURIES

During the first World War one of the most frequently observed disturbances, occurring especially in areas of artillery action, became known as "shell shock," or "shell concussion." The victims of such injuries were often found unconscious, or at times in a semiconscious condition, and yet showed no evidence of any actual external injury. Not infrequently the victims of such injuries were found dead. Autopsies showed evidence of numerous petechial hemorrhages in the brain. In addition, Mott also showed that many of these patients were actually the victims of carbon monoxide poisoning, and it was further shown (36) that many of the "deaths from blast" really resulted from carbon monoxide poisoning of victims who were rendered unconscious and who were trapped under fallen débris. It is now believed by some that many of the "shell shock" and "shell concussion" cases of the first World War were possibly cases of what we now know as blast injuries.

In the War just ended "blast injuries" attracted considerable attention and were the subject of many studies and reports (7, 39, 110, 111) made especially by the British. As one surveys the literature on this type of injury, he is impressed with the fact that "air blast" victims suffer injuries predominantly to the structures within the thoracic cavity, especially the lungs (5). On the other hand, "underwater" or "immersion blast" injuries result in damage affecting principally the intraperitoneal structures. "Solid blast" injuries (7) usually result in farctures involving the lower extremities, the hips, pelvis, or spine. Thus far, the writer has been unable to locate any reference to solid blast injuries which caused damage to intra-abdominal or intrathoracic structures. On the other hand, "air blast" injuries, although predominantly involving the intrathoracic structures, may likewise be complicated by some intra-abdominal damage, and "immersion blast" injuries, although mainly involving the intra-abdominal structures, may also result in trauma to the lungs. It is very likely, too, that all types of blast injury

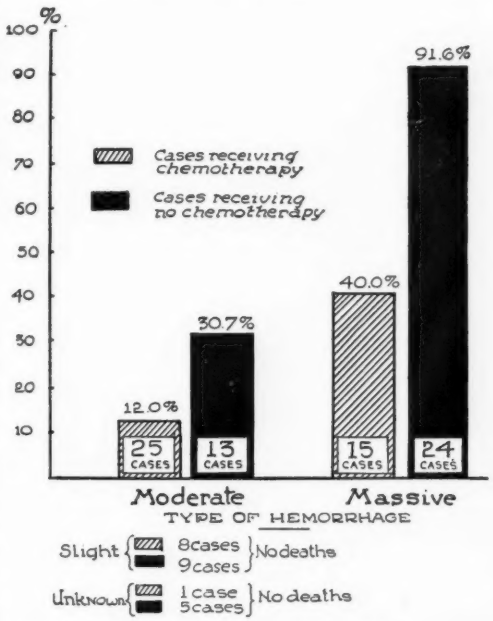

Fig. 14. Graph showing relationship of hemorrhage to mortality rate in a comparative study of 100 cases admitted to the New Orleans Charity Hospital from July 9, 1938 to July 9, 1942. The influence of chemotherapy on 49 patients is compared with a group of 51 cases receiving no chemotherapy during this same period of time.

victims also have an involvement of the central nervous system to a lesser or greater extent.

It is the opinion of Rose and Watson (94) that "the prognosis of an abdominal injury, whether subcutaneous or penetrating, is rendered graver when the injury is accompanied or complicated by blast effects." The pathologic findings in blast injuries which predominantly involve the chest are pulmonary hemorrhages of varying degrees, contusions, and possible lacerations of other intrathoracic structures. Blast injuries which predominantly involve the abdomen result in submucosal, subserous, or intramuscular hemorrhagic areas that may be found in any part of the gastrointestinal tract but more especially the lower ileum and large bowel. Such hematomas may also be seen in the great omentum and mesentery as well as in the retroperitoneal tissues and the solid viscera. When perforations or lacerations occur, they are more likely to involve the small intestine. Hence, although death from uncomplicated primary blast was rather rare, some of these patients were injured sufficiently seriously to succumb.

The signs and symptoms of blast injuries of the abdomen are essentially those seen in any acute abdominal catastrophe. Severe abdominal pain is frequently accompanied by nausea and vomiting. There is usually generalized rigidity and tenderness. An absence of peristaltic waves should make one very suspicious of intestinal perforation. This may be confirmed by the finding of free air in the peritoneal cavity on x-ray examination. Unless there was very serious damage, such as intestinal perforation or laceration of a solid viscus, almost all of these cases showed evidence of improvement after several hours, following which the signs of serious or grave danger disappeared more rapidly.

All patients with blast injuries were treated with the usual resuscitative measures. Plasma and blood were given freely. Every effort was made to restore the victim's normal fluid and electrolyte balance. It was indeed seldom that any patient with a blast injury involving the chest required operation. Some of those with abdominal blast injuries, especially those showing evidence of intestinal perforation or severe internal hemorrhage, had to be celiotomized, and, frequently, the victim's life was saved.

INJURIES TO THE EXTRAPERITONEAL STRUCTURES

In general, the question of preoperative diagnosis in abdominal injuries, and especially those involving the extraperitoneal portion of the rectum and other extraperitoneal structures, has previously been given too little attention. Mainly because of this lackadaisical attitude, usually on the part of those handling these cases, many victims of traumatic abdominal catastrophes who might have been saved have died. The mortality rates in the past have been extremely high. Not infrequently the surgeon, because he believed the missile could not have passed through a given area, or because he felt that a given crush injury could not have involved a given structure, has failed to repair damage that ultimately meant death to the victim. Failure to examine the urine preoperatively, or to examine the rectum digitally or proctoscopically, has on occasions caused the attending surgeon much embarrassment postoperatively.

The lessons learned in the past along these lines were very useful in the recently ended second World War and, undoubtedly, led to the saving of many additional lives. The percentage of overlooked serious injuries to abdominal structures was probably less during the recently ended conflict than heretofore. Badly damaged kidneys were removed and the loss of blood from this source stopped in time to save the life of many such victims. Catheterization often revealed injury to the kidney, ureter, bladder, or urethra which might otherwise have been overlooked. Digital and proctoscopic examinations of the rectum often surprised the examiner with evidence of injury to this structure. Hence, the greater care exercised in making a more accurate preoperative diagnosis in these cases of injury to the extraperitoneal portion of the rectum and other extraperitoneal structures, undoubtedly, had much to do with the lowered mortality rates reported by many writers (18, 29, 41, 54, 55). The adage "to be forewarned is to be forearmed" is just as important to the surgeon in dealing with abdominal catastrophes as it is to anyone else in any other field.

Injuries involving the abdomen—especially the lower half—the buttocks, sacrum, or hips, or any gunshot injuries of the posterior aspect of the thigh which seem to have an upward course, particularly when there is no exit point, should invariably call for at least a digital examination of the rectum. If considered necessary, a proctoscopic examination, very carefully done, should also be made. According to Laufman, "the patient with a penetration of the extraperitoneal portion of the rectum may present no symptoms referable to this organ at the time of initial examination." Although only 6 per cent (55) of all buttock wounds involve the rectum, it is well to keep Laufman's warning in mind that "missiles entering the body anywhere between the levels of the lower thigh and the costal margin have been known to penetrate the rectum."

The operative treatment of wounds involving the extraperitoneal portion of the rectum is divided into two phases: (1) the management of the rectal injury, and (2) the "construction of a temporary, occlusive colostomy." It is considered best to do the perineal or posterior portion of the operation first. Adequate drainage of the perirectal region is of great importance. Laufman believes that it is not necessary to remove the coccyx to secure good drainage of the perirectal space. In addition to proper and adequate drainage of the perirectal space, a thorough débridement of the area involved should always be done, and any large defect in the rectal wall should be properly repaired.

UNUSUAL INJURIES INVOLVING THE PERITONEAL CAVITY

The most unusual kinds of accidents have been known to result in injuries involving the peritoneal cavity as well as other cavities. Among the most interesting of these are impalements and other accidents of a similar nature.

Although impalement is not considered as a diagnosis in the last (1946) edition of the "Standard Nomenclature of Disease" and "Standard Nomenclature of Operations" published by the American Medical Association, this unusual and frequently bizarre, ghastly, and gruesome condition is so different from the usually pictured penetrating and perforating wound of the peritoneal cavity that it appears more proper to discuss it under this heading. Certainly, such accidents give rise to unusual and very often freakish injuries involving the body cavities. Historically, no other type of wound is as interesting as impaling injuries.

According to Pennington, "the Oriental races have always been noted for their ability to devise fiendish forms of punishment, ... and one of their devices was impalement. This was carried out in two ways—the victim was laid down and the stake driven into the body; or else it was planted in the earth and the culprit fastened to it so his weight caused the body to become impaled. This form of punishment dates back to the hoary past . . . . .

"In ancient Rome impalement was at first restricted to slaves who had been guilty of robbery. Later on, Nero resorted to it among other measures in his persecutions of the Christians. Soon after the irruption of the Ottoman Turks into Europe they made use of it for various offenses: Those guilty of business transactions between Mohammedans and Christians, treason, fraud against the Sultan, etc. In Russia, Germany, and Austria, it was generally prevalent up to a comparatively recent period in cases of murder and witchcraft. For adulterers caught *in flagrante delicto*, according to Silbermark, double impalement was in vogue. We learn from Fairlie, that in the Malay Peninsula, a unique method is in use for female marital infidelity: Some species of bamboo grow there with extraordinary rapidity, and the one selected increases in length 24 inches in 24 hours. A young shoot just sprouting from the ground is selected, and the end whittled to a sharp point; the condemned woman being lashed to stakes over the bamboo is impaled in two days.

"During the hand-to-hand combats of the Middle Ages, when the body was largely protected by plate-and-mail armor, the rectum probably escaped injury. Though this immunity disappeared with the introduction of gunpowder. However, the feeble penetrating power of the old round—and even the conical bullet later had little effect on the lower bowel in its bony encasement. With the advent of the modern small-bore projectile, of enormous velocity, which respects nothing in its course, rectal wounds, ... have become relatively numerous.

"One of the English kings, Edward II, was murdered (A.D. 1327), by having a red hot iron thrust up the rectum; and it is rumored this was one of the many arguments adopted by the Inquisition to admonish heretics. At the time (17th and 18th centuries) when clysters were a panacea for every imaginable ill, and they were administered by the ignorant nurses of the day or even laymen, e.g., druggists, apprentices, serious and fatal injuries from the syringe points were somewhat frequent. This was before the days of rubber, when metallic instruments alone were available; in fact, such mishaps have been recorded well into the last century."

Today, although impaling wounds are relatively rare, they nevertheless rather frequently involve the peritoneal cavity and are of sufficient importance to be included in any discussion which considers trauma to the perineum in general, and to the vagina, anus, and rectum in particular. It is of interest to note, according to Black (11), that "seven cases of rectal impalement with damage to intraperitoneal viscera were encountered at the (Mayo) Clinic from 1910 to January 1, 1939." From January 1, 1896 to January 1, 1948, the Charity Hospital of Louisiana at New Orleans admitted 12 cases of impalement wounds which involved the abdomen. Five of the patients were negro males. Among the 7 white patients 2 were females.

Almost every perineal and pelvic structure, and many abdominal and thoracic structures have been injured (66, 87) as a result of impalement. Although the literature on this subject is small, interesting individual cases, as well as collected groups of such cases, have been reported from time to time. Impalement injuries are very rare in warfare. They are almost entirely a civilian type of injury, relatively more commonly seen in agricultural districts. Severe and serious injuries to the urethra, vagina, urinary bladder, prostate gland, seminal vesicles, and ureters are not infrequent, and injury to almost any portion of the gastrointestinal tract is not impossible. Usually because of the manner of entrance of the impaling object, as well as the position of the large vessels, injury to the latter is relatively rare. Most of the fatalities in this kind of case result from generalized peritonitis. Relatively few victims die of hemorrhage and shock.

Most impaled injuries result from falling in such a way that the body strikes the object, usually a stake or picket, with a considerable force. Possibly no other field in traumatic surgery can claim any more unusual and bizarre kinds of accidents than this one. In many instances, perversions have been responsible for the introduction

of rather large, gruesome, and ghastly foreign bodies into the vagina and rectum. The introduction of rather stiff rectal rubber tubes have been known to result in perforations of the rectosigmoid. Proctoscopic examinations (95) and enemas (81) have also resulted in serious injury to the bowel.

Involvement of the peritoneal cavity is often very difficult to determine. Frequently, the victim removes the foreign body and walks a long distance to his home. However, the onset of severe lower abdominal pain followed often by collapse should remove all doubt as regards the advisability of emergency celiotomy. Digital examination of the rectum, although indicated, will frequently give very little information. Proctoscopic examination is usually mandatory, and the finding of air under the diaphragm is practically positive evidence of intestinal perforation. Bloody urine is almost invariably conclusive proof of serious injury to the urethra, bladder, or ureters. Nausea, vomiting, a rapid pulse, and fever are signs which develop somewhat later. In the transportation of these patients, the sitting or semisitting position is considered best and advisable.

Synopses of 4 of the 12 cases of impalement received at the New Orleans Charity Hospital are being given because of their unusual and interesting aspects.

CASE 1. A white male, a fireman 34 years of age, who on December 25, 1925 was struck in the buttocks and in the perineum by a forceful stream of water from a fire hose. Upon admission to the hospital, his scrotum was found to be markedly swollen and painful. A 6 inch laceration exposed the muscles on the inner aspect of his right thigh. The perineum was lacerated in a stellate manner, and the sphincter was torn in its posterior area. The laceration ran up the posterior aspect of the rectum for 3 or 4 inches. Treatment consisted of packing and daily irrigations. The patient left the hospital on March 22, 1926.

CASE 2. A white male saw-miller, a laborer of 56 years. While at his work on December 19, 1934, a stick flew off of the saw and entered the lower left abdominal quadrant making its exit in the right gluteal region. At operation, the stick was found to have struck the iliac crest in such a way that it split and one portion passed through the gluteal muscles to the right. The other portion, nearly 1 inch in diameter and 18 inches long, dissected the left iliopsoas muscle up as high as the kidney. Multiple lacerations were found in the ileum and 2 feet had to be resected. Other pieces of splinter were removed. The patient died of generalized peritonitis on December 27, 1934.

CASE 3. A male negro, 16 years of age, who was admitted on April 23, 1939. While riding a horse, the patient fell off and landed on a picket which penetrated the right side of his abdomen. In the operating room, pieces of clothing were removed from the abdominal wound. When the abdomen was opened, a piece of wood 10 inches long, 1¾ inches wide, and 1 inch thick was found to be wrapped up with omentum. A 2½ inch "transverse rent" in the descending colon was repaired. The stick was freed from the omentum with difficulty, and was only "pulled" from the wound "after a mighty heave." The patient expired the next day.

CASE 4. A white female, 28 years of age. She was admitted to the hospital on January 19, 1945 with the complaint of "bottle in rectum." The patient said that a friend introduced a coca cola bottle in her rectum while she was intoxicated. Examination showed the base of a coca cola bottle 2¾ inches above the rectal sphincter.

Under spinal anesthesia, the bottle was extracted with a large clamp with some difficulty. No perforation was observed. Twelve hours later, the patient presented evidence of generalized peritonitis. An emergency operation was performed and generalized peritonitis, more pronounced in the pelvis, was found. No attempt to find the site of perforation was made. About 500 c.c. of purulent material were aspirated from the pelvis, a Mikulicz colostomy "of the sigmoid was done," and the patient returned to the ward in fair condition. She left the hospital on February 24, 1945, and on September 18, 1945 the colostomy was closed.

Of unusual interest, also, are 2 cases of such injuries treated by two colleagues, Drs. H. H. Russell and D. J. Murphy, at the Hotel Dieu Hospital of New Orleans.

CASE 5. A white female, 57 years of age, was first seen on August 23, 1943 with the complaint of severe lower abdominal pains, fever, nausea, and vomiting. The history revealed that 3 or 4 days previously a rectal examination was done elsewhere with a proctoscope. On August 24, a vaginal diagnostic aspiration of the cul-de-sac showed the presence of a foul smelling fluid with a Bacillus coli odor. On September 4, 1943, a posterior colpotomy allowed the escape of about 1,000 c.c. of a foul smelling sanguinopurulent material. The patient was discharged from the hospital on September 10, 1943 after a very stormy postoperative state.

CASE 6. A white male, 48 years of age, was admitted on January 13, 1946 with the complaint of severe abdominal pain. A few hours before, this patient, because he had been constipated, took an enema by attaching the rubber tubing of an enema bag to the faucet of his bath tub. He inserted the nozzle into his rectum and turned on the water. After "a brief period," he was seized with a sudden violent abdominal pain and collapsed on the floor. Upon reaching the hospital in an ambulance, he was more comfortable and refused operation. However, on January 21, 8 days after admission, he consented to an operation. This was done under spinal anesthesia and a large amount of liquid feces was found in the peritoneal cavity and removed. In the terminal ileum, there was found "a rent" about 24 inches long. About 3 feet of ileum were resected. The patient died about 14 hours later.

Autopsy showed, among the usual other findings, a "traumatic rupture of the rectum and ileum" and generalized peritonitis.

ANESTHESIA IN THE SURGERY OF ABDOMINAL TRAUMA

It is doubtful that any sufficiently effective anesthetic agent was ever used in the management of abdominal injuries before 1846. It is very likely too, that patients with abdominal trauma were among those subjected to operation, under the influence of ether or chloroform, during the period of greatest controversy regarding anesthesia in this country between 1846 and 1863. Spinal an-

esthesia, introduced in 1885 by Corning (56), was probably not used in the operative treatment of these patients until after the beginning of the present century.

The story of the development of anesthesia, so interestingly told by Keys and so excellently and thoroughly outlined by Leake, plays a most important role in the management of all types of serious wounds, and especially in the treatment of wounds of the abdomen and chest. To the surgeon who has been given the responsibility of treating a seriously wounded abdomen there is nothing as important, during the period of operation, as a well relaxed and calm abdomen. It is only an abdomen in this condition that will permit of the most thorough exploration with the least added trauma and in the shortest period of time. Nothing will handicap the surgeon's work in these cases more than a poorly administered anesthetic, and nothing will help the causes of thoroughness and expeditiousness more than a good relaxing anesthetic.

Plain drop ether was for many years the anesthetic of choice in the operative treatment of the injured abdomen, especially at the New Orleans Charity Hospital. Gillies and Evans say that "in surgery for abdominal trauma, inhalational anesthesia with nitrous oxide and oxygen, supplemented by local infiltration or intercostal nerve block, is the method of choice, especially in the presence of shock. Alternatively, cyclopropane and oxygen may be used, and in cases exhibiting little or no shock, gas, oxygen, and ether may be required because the threshold of the patient's resistance to anesthesia has remained at its normal level." Turnbow is of the opinion that "in general, combinations of anesthetic agents are safer for seriously injured patients." He considers spinal anesthesia "to be unsafe . . . and was used infrequently." In the majority of his cases, Eaton induced anesthesia "with ethyl chloride or pentothal, then switching over to warm ether from the Oxford vaporizer." In general, most of the surgeons reporting their experiences during the recent World War (II) preferred ether as the anesthetic of choice. Induction was usually accomplished with nitrous oxide or pentothal sodium given intravenously.

Almost from the time it was introduced, spinal anesthesia has been considered very dangerous in this type of patient, and the chief reason given is that it adds to the shock of these usually already shocked patients whose general preoperative condition is frequently very poor. Nearly all reports from the recently ended War condemn spinal anesthesia as being unsafe and dangerous in these cases. However, none of these reports include any appreciable number of cases in which spinal anesthesia was used. On the other hand, Davis has "found spinal anesthesia the most suitable . . . notwithstanding the presence of severe shock and hemorrhage." In a relatively recent study of 478 cases of penetrating gunshot wounds of the abdomen, the writer (62) found that a group of 74 patients operated upon under spinal anesthesia showed the lowest mortality among the large groups. The present general impression is, also, that intravenous anesthesia is not especially suitable for cases of abdominal trauma unless oxygen and curare are used with it.

TABLE III.—TYPES OF ANESTHESIA USED IN 366 CASES OF PENETRATING ABDOMINAL GUNSHOT WOUNDS OPERATED UPON AT THE NEW ORLEANS CHARITY HOSPITAL BETWEEN JANUARY 1, 1927 AND JANUARY 1, 1942. IT IS INTERESTING TO NOTE THAT THE GROUP OPERATED UPON UNDER SPINAL ANESTHESIA SHOWED THE LOWEST MORTALITY RATE AMONG THE THREE LARGE GROUPS.

Anesthesia	Total	Lived	Died	Mortality Per Cent
Ether	191	83	108	56.54
Ethylene	9	6	3	33.33
Nitrous oxide and ether	7	2	5	71.42
Cyclopropane	5	4	1	20.00
Local	7	3	4	57.14
Spinal	74	51	23	31.08
Ether and ethylene	35	13	22	62.85
Spinal and ether	5	2	3	60.00
Epidural	5	0	5	100.00
Epidural, ether, and ethylene	1	0	1	100.00
Epidural and ethylene	1	0	1	100.00
Cyclopropane and ether	16	13	3	18.75
General	4	3	1	25.00
Cyclopropane, ether, and ethylene	1	0	1	100.00
Ethylene and cyclopropane	1	1	0	0.00
Not given	4	2	2	50.00

WAR BULLETIN ON ABDOMINAL WOUNDS

Of special interest during the recently ended World War were the bulletins on the management of different types of wounds issued by the various War Offices. One such bulletin, which reviews the general management of abdominal wounds in the light of relatively recent war experiences, and

which was issued by the British War Office, has been considered sufficiently interesting and important to be quoted in full in this presentation:

"This article (4) should be regarded as an extension to chapter 20 of the Field Surgery Pocket Book. (1) What was written there in 1943 has stood up well to later experience in the field, but fresh campaigns have taught new lessons and re-emphasised the importance of old teachings—above all on the importance of postoperative care.

"When to operate

"Everyone agrees that men with abdominal wounds need operation as early as possible if they are to have the best chance. But too literal an interpretation of this phrase 'as early as possible' may result in men being operated on in areas so far forward that bad conditions more than counter-balance the benefits of a few hours gained. It cannot be emphasised too strongly that men with belly wounds do badly in noisy surroundings; peace of mind is one of their great needs, and sick men cannot always differentiate the noise of our own guns from that of enemy bombs and shells. Sometimes in isolated places there was no alternative to operation on the spot—as on the Anzio beach-head—but the patients were in a constant state of alarm and never got really restful sleep. Some even jumped out of bed and crawled under it for protection, and many Field Medical Cards noted that the medical services were 'forced to evacuate this man because of his mental state.' Under such unfavourable circumstances, heroic doses of luminal are justified. Grains 5 may be given twice daily and continued with safety for several days; this treatment does not paralyse bowel action, which is a serious objection to repeated doses of morphine.

"In practice there are very few belly cases that cannot be sent off at once or after an hour's resuscitation. With a travelling transfusion (2) (in ambulance drip) where necessary, they will travel safely, and with great subsequent advantage, to a surgical centre some two hours down the road, where quiet and the best nursing can be given. It is of particular importance to the success of a travelling transfusion that the needle should be inserted far enough into the vein; otherwise plasma leaks into the subcutaneous tissue. Apart from any other consequences, this completely spoils the area for further transfusion. Almost the only type of abdominal wound in which half-an-hour makes all the difference between life and death is that where haemorrhage is the predominant feature. These cases can be diagnosed by the presence of abdominal rigidity, pallor, rapid pulse, and low blood pressure—signs that are established in about 2-3 hours after wounding. Therefore, unless the position is an isolated one or there is evidence of haemorrhage, all men with belly wounds should be sent to an Advanced Surgical Centre to have treatment in its safety and relative quiet.

"Diagnosis

"Position when wounded. It is important to try to learn from the patient what position he was in when he was wounded—was he standing, running, kneeling, crawling, prone, or what? The answer is of great help in working out the lesions that are to be expected.

"Peristaltic sounds. The presence or absence of peristaltic sounds has considerable significance, though there is no absolute rule. When sounds are present, there is not likely to be any perforation of a hollow viscus, though intestinal rumblings may be heard when there is a small hole in the pelvic or sigmoid colon. Absence of sounds is very suggestive of perforation of hollow viscera, but auscultation should be repeated at intervals, especially if there is no rigidity and if other signs—such as those of haemorrhage—are absent. A blow in the stomach, or exposure to blast, may cause peristalsis to cease for an hour or so, after which it starts again.

"Resuscitation

"As with all wounded, the sooner the man with wounds of the belly is got to an Advanced Surgical Centre the better, and it is important to persuade R.M.Os. and M.Os. of Field Ambulances not to spend too much time on resuscitation. (3) Not all abdominal cases require intravenous fluids, and when these are thought necessary it is best to give plasma unless there are signs of haemorrhage. Too much blood may precipitate anuria in abdominal cases. At R.A.P. or A.D.S. level, it is better to give one or two pints only and then send the man without further delay to the Surgical Centre with a travelling transfusion in the ambulance. If signs of intra-abdominal haemorrhage are present, blood should be given in the same way, but in these circumstances it is even more important to get the patient to the surgeon as soon as possible.

"Operation

"General. There is much to be said in favour of the midline incision; if a paramedian skin incision is used, the whole rectus muscle should be deflected laterally, because the more usual practice of splitting the rectus may deprive the inner part of the muscle of its blood and nerve supply. Un-

hurried speed is essential; for with every five minutes beyond the hour there is a worsening of the patient's condition. It is important to make the incision long enough, and to avoid pulling on the parietes with retractors; this always leads to a fall of blood pressure.

"Anaesthetic. A number of surgeons and anaesthetists are now using intercostal block anaesthesia combined with light intratracheal gas, oxygen, and ether. All agree that this gives perfect relaxation and that post-operative chest complications are less common than with other anaesthetics.

"Colostomy. Every endeavour should be made to fashion a double-barrelled spur. When stitching the parallel limbs together it is a good thing to rotate the loop in its long axis somewhat, so that the contiguous surfaces are well away from the mesenteric border; this obviates the risk of damage to the blood supply by the subsequent application of the enterotome.

"Large-Intestine Wounds. Many experienced surgeons are moving away from the principle that a damaged colon must always be exteriorised. They feel that in the right half of the colon small perforations with clean-cut margins and no surrounding bruising can be safely dealt with by careful suture. A number of small perforations of the anterior wall of the rectum have been similarly treated. It is essential for safety, however, that a small drainage tube should be put down to the site of suture and left in position for three to four days, and it is wise to cover the suture line with omentum if this is practicable. A variation is to anchor the sutured colon to the parietal peritoneum with a few stitches.

"Opinion has shifted thus from the more orthodox view because many surgeons felt that the amount of mobilisation which was sometimes necessary carried with it a risk of shock that was a greater danger to the patient than the possibility of an intra-abdominal abscess. They also knew from hard experience that colostomies performed hurriedly in a patient ill from multiple wounds are not always easy to close at a later date; and, of course, a colostomy is not a pleasant thing for the patient.

"The results have been satisfactory in the hands of surgeons who have long experience and are skilled in their selection of cases; the less mature who are in any doubt should always exteriorise. It is worth repeating:"

(1) suture should be employed only if the hole is small and there is no surrounding bruising of the adjacent bowel wall; (2) a drainage tube should be employed.

"Postoperative care

"The first 24 hours after operation should be regarded as a second phase of shock, initiated by a second trauma—the operation—and the same careful observations on blood pressure should be made as in the resuscitation ward. All cases return from the theatre on intravenous fluids; serial blood pressure readings should help to fix the decision on the continued use of blood, plasma, or glucose-saline, and on the rate of the drip.

"Gastric suction. Every belly case is put on continuous gastric suction; this and intravenous therapy are usually maintained for about three days, until there is no distention and until peristalsis is active. From the second day onwards it is wise to give fluids by mouth, clipping the suction tube for about an hour afterwards. These drinks can be started at the rate of 1 ounce 2-hourly for 12 hours; then they can be increased to 2 and later to 3 ounces. It has been found in many cases that about one-third of the fluid taken by mouth passes the pylorus and is absorbed. This in itself is valuable and has a great effect on the morale of the patient. It is a good thing also to include in these drinks nutrients such as glucose, tinned milk, Benger's food, thin soups, and ice-cream. Amino-acids in their present preparations are too unpalatable for administration in this way, but if this difficulty is overcome they will be of great value.

"In the early days after operation it is most important to keep careful fluid charts that show intake by vein and mouth and output by urine and suction. Daily intake should be 4-5 pints in cool climates and 7-8 pints in hot weather.

"To help overcome the lack of protein in this regime, one or two bottles of plasma (or serum, which contains about twice as much protein as plasma) should be given daily. The Shock Research Team (3) has recently drawn attention to the serious deficiency in chlorides that develops early during this regime. On this point, the following remarks kindly offered by Dr. R. A. McCance are helpful: 'A rough way of meeting the salt requirements of the body is to give 2 pints of plasma or of normal saline daily, plus one pint for every pint of gastric contents withdrawn by suction, but more saline (up to 4 pints) may be needed in tropical climates or if the urine does not contain chlorides. The remainder of the fluids given should be 5 per cent glucose or other non-saline fluids.' About the 7th–8th day after operation, blood should be given, if necessary, to keep the haemoglobin level up to 60–70 per cent at the very least.

"In quiet times each surgeon will probably wish to apply his own particular ideas about post-operative treatment, but when things are busy individual differences of detail must go overboard in favour of a common routine for all in the particular centre. It is best if a senior M.O., familiar with this type of work, can be put in charge of the post-operative ward, so that he can modify the routine according to the needs of individual patients.

"Complications

"Anuria. Renal failure with anuria occurs in a proportion of all seriously wounded men, no matter whether they have been transfused with blood or with plasma or have not been transfused at all; the incidence is relatively high with belly cases. The cause is not fully understood, but there can be little doubt that prolonged tissue anoxia preceding restoration of circulatory efficiency may cause irreversible kidney damage, even though the patient's life is temporarily saved by resuscitation and operation. In belly cases additional factors may operate. Thus, there may be prolonged spasm of the renal arteries from irritation of the sympathetic ganglia by retroperitoneal haemorrhage around the coeliac plexus. Sympathetic overaction from the same cause may also explain the slowing down or cessation of intestinal peristalsis, with resulting distention; this is sometimes seen in oliguric cases, and is often associated with the retroperitoneal haemorrhage of fractures of the spine.

"A badly-judged resuscitation technique may readily contribute to or even precipitate renal failure. Mis-matched transfusion, with gross intravascular haemolysis, is an obvious cause. Massive transfusions of old stored blood may likewise lead to a degree of intravascular haemolysis, which is the equivalent of a mis-matched transfusion. The Shock Research Team (3) have made surgeons alive to this risk.

"Another factor which may lead to renal failure is the continuous administration of those sulphonamides, which tend to form acetylated insoluble crystals (sulphapyridine, sulphathiazole, sulphadiazine), without careful supervision of fluid intake and urinary output.

"The most rational prophylactic treatment is to restore the efficiency of the circulation at the earliest possible moment, with plasma unless fresh blood is available. With an efficient circulation, blood is only required in an amount sufficient to ensure a haemoglobin level of not less than 70 per cent at operation. The second measure is to ensure adequate hydration with a good urinary output.

"When oliguria arises and anuria threatens, treatment is not promising, but it is worth trying some of the following:

"(1) Sodium citrate, grains 120 at once and grains 60 every 4 hours.

"(2) 600 c.c. sodium citrate (3%) in 2,500 c.c. glucose (5%) as a slow drip in 24 hours.

"(3) 100 c.c. of 10–50 per cent glucose given slowly by the intravenous route. (The rationale of this suggestion rests on the idea of dehydrating an oedematous organ by hypertonic solutions. For diuresis, 10–20 per cent solutions of glucose are generally used, but 50 per cent solutions can be given without ill effect.)

"Conservative Treatment

"It may be possible for the surgeon to treat a case expectantly if, with the help of X-rays, he can make an intelligent estimate of the track and probable resting-place of the foreign body, and if there are no more than minimal signs of intra-abdominal perforation. Foreign-body fragments may lodge in the liver, kidney, peri-renal tissues, para-vertebral gutters, buttocks, or perineum without having penetrated the peritoneum. In such circumstances operation should be withheld if there are no signs of peritoneal irritation. It is in such cases that the presence of peristaltic sounds fortifies the resolve to adopt conservative treatment. In a recent series of 33 patients so treated only 3 died—a much lower mortality than would have been expected if exploratory laparotomy had been performed.

"Penicillin

"In belly cases, penicillin is still in the experimental stage. Some of the complications—pneumonia, pelvic and subphrenic abscess, peritonitis, and wound infection—are usually caused by penicillin-sensitive organisms; therefore, it is rational to use penicillin, since the drug is now in abundant supply. Many surgeons think its use has been a potent factor in reducing chest complications and wound sepsis. The present dosage is 15,000 Oxford units 3-hourly for 7 days or 100,000 units in 500 c.c. of normal saline every day for 7-10 days by continuous intramuscular drip. (4)

"Evacuation

"Abdominal cases travel badly by sea or air even when the wound has healed. Almost all cases are now held for at least 10 days before being moved from the Advanced Surgical Centre, and this should be the routine. If the laparotomy wound goes septic, they should be held until the wound is clean.

Fig. 15. General Edward M. Packenham, commander of the British forces at the Battle of New Orleans, who died from a wound involving the "common iliac artery."

"Delayed suture of other wounds

"Abdominal wounds are very often accompanied by wounds of the limbs. The patient is not really fit for a second anaesthetic about the third or fifth day, which is the ideal time for the delayed suture of these wounds. One solution of this problem is to insert stitches at the first operation but to leave them untied until the wound is ready for closure.

REFERENCES

"1. See also footnote to page 1 of A.M.D. Bulletin, supplement No. 22, May, 1945; and A.M.D. Bulletin, 1945, March, No. 45, article 345.
2. A.M.D. Bulletin. 1943, November, No. 29, article 228.
3. Ibid., 1945, January, No. 43, article 329.
4. Memo. on Penicillin Therapy in 21 Army Group, February, 1945."

NOTABLES IN AMERICAN HISTORY WHO WERE VICTIMS OF PENETRATING ABDOMINAL GUNSHOT INJURIES

Because a number of notables in American History were the victims of penetrating abdominal gunshot injuries, the writer believes that a brief review of the most outstanding of these cases should not only prove interesting but likewise very important from the historical point of view. Several other cases involved rather important persons of the day, but those have not been judged as of sufficient historical importance to merit consideration in this particular presentation.

Fig. 16. William Beaumont collecting gastric juice from the stomach of Alexis St. Martin.

As far as the writer has been able to determine no conspicuous person in American history has ever been the victim of assassination by stabbing, and certainly none by an abdominal stab wound. Each of the individuals herein considered was the victim of an abdominal gunshot injury, and true to the traditions of this type of injury, all died except one. Lincoln was shot in the head, and Anton J. Cermak, the late and lamented Mayor of Chicago, who received the bullet intended for our late and beloved President Franklin D. Roosevelt, was shot in the right side of his chest, but died of general peritonitis. Accordingly, these 2 cases have been excluded from this study.

General Edward M. Packenham

The case of a "Major King of the Fusileers" (43), who was killed at the Battle of New Orleans, is herein considered because this British officer

Fig. 17. President James A. Garfield.

was the victim of a "musket-ball, which struck him on the pit of the stomach, leaving only the appearance of a contusion, apparently in the same manner as a blow from the hand of a pugilist on the same part." Of much greater interest, in this battle, is the death of Major General, the Honorable Sir Edward Michael Packenham, commander of the British forces, who received an abdominal wound involving the "common iliac artery" which "killed him on the spot." This casualty very probably had much to do with the ultimate outcome of this important engagement.

Alexis St. Martin

It took a penetrating abdominal gunshot injury, in addition to the perseverance, foresight, and good fortune of a young United States Army Surgeon, to win undying fame for Alexis St. Martin, an otherwise unknown young Canadian trapper, who under less favorable circumstances would have been doomed to oblivion. When St. Martin was accidentally shot on June 6, 1822 little did he realize what an important contribution he was to make to our knowledge of the physiology of the stomach, and little did William Beaumont (82), the young Army surgeon who has himself been labeled one of humanity's great benefactors, realize that this single case was to win for him immortality in the annals of medical history.

The wound suffered by St. Martin, as the result of the accidental discharge of a musket loaded with "duck shot," was an abdominothoracic type of injury which opened the upper left side of the abdomen and the lower left side of the chest. The whole load struck the victim from a distance of 2 or 3 feet and carried away an area of tissue larger than the size of the palm of a man's hand. Beaumont, who arrived a few minutes after the accident, noticed that the load had struck St. Martin tangentially, tearing away parts of the fifth and sixth ribs, and leaving a large opening in the peritoneal cavity with protrusion of the lower lobe of the left lung from the thoracic cavity. The stomach was lacerated and there was much devitalization of the overlying and surrounding tissues. Because of these injuries Beaumont considered any attempt to save the victim's life as entirely useless. Accordingly, since he was unable to replace the lung properly, he took out his penknife and cut away the excess. Then he applied a superficial dressing and left, expecting the victim to die in 20 minutes.

On his return, to his great astonishment and amazement, he found St. Martin still alive. After removal to more suitable quarters St. Martin was very ill for many days before he began showing evidence of recovery. Convalescence continued for many months, during all of which time Beaumont made every effort at his command to close the opening in the victim's stomach, which persisted in spite of all methods of treatment used. Since he was unable to close this opening, early in 1825 Beaumont conceived the idea of carrying out a series of experiments. However, on several occasions St. Martin disappeared, usually not to return until after several months had passed. At times Beaumont became exasperated and almost frantic in trying to keep up with the movements of his patient. Finally he was able to complete his experiments and he published his work in 1833. Alexis St. Martin lived, with this permanent gastric fistula, for nearly 60 years after the accident, dying in 1881 and outliving Beaumont, who died in 1853, by 28 years. St. Martin died at the age of 78 years.

President James A. Garfield

At 9:30 in the morning on July 2, 1881, shortly after entering a railroad station in Washington, D. C., President James A. Garfield (89) was approached by Charles J. Guiteau, a Chicago attorney, who shot at the President twice before he was stopped and apprehended. The first of the bullets from the assassin's revolver struck President Garfield in the right arm, producing a slight flesh wound. The second bullet "entered the right side of the back, four inches to the right of the spinal

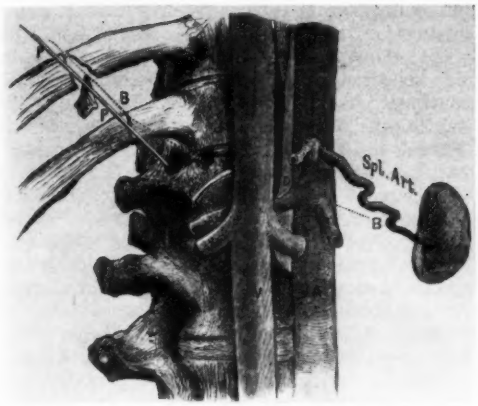

Fig. 18. Course of the bullet in the case of President Garfield. The diagram shows how the bullet fractured the right eleventh and twelfth ribs posteriorly, passed through the first lumbar vertebra and grazed the splenic artery, and resulted in an aneurysm which upon rupture caused death. (*From:* Med. News, 1882, 40: 678.)

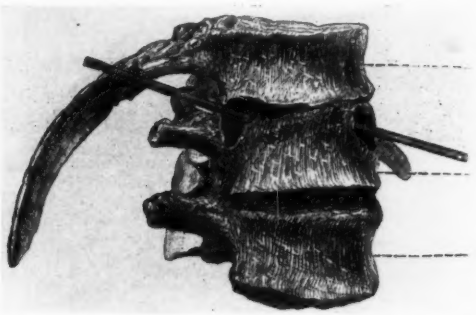

Fig. 19. Diagram showing the course of the bullet through the first lumbar vertebra in the case of President Garfield. (*From:* Med. News, 1882, 40: 678.)

column, and on a level with the twelfth, the lowest of the dorsal vertebrae, and passing at first forward, fractured the eleventh and twelfth ribs, then deflected to the left, passed through the body of the first lumbar vertebra, in an oblique direction to the left, and emerging thence, passed behind and below the pancreas where it was found at post-mortem examination. The second bullet in its course penetrated some of the branches of the mesenteric arteries and grazed the splenic artery."

Thus injured, the President was returned to the White House where he was treated conservatively according to the customs of that day by a group of eminently capable surgeons. The wound in his back was probed several times; he was fed small quantities of liquid foods, usually by rectum and occasionally by mouth; opium was used for pain; and among the other discomforts, he had to endure the annoyance of a hot and stifling summer heat. When the end finally came, the President, who when shot weighed 210 pounds, probably did not weigh more than 135 pounds.

On September 6, after several requests by their noted patient, the surgeons in charge permitted removal of President Garfield from the White House to the Francklyn Cottage in Elberon, New Jersey. His convalescence at Washington had been rather stormy, and very trying both to the patient as well as to the attending physicians. When removed to Elberon he appeared to have improved somewhat, and it was felt that the seashore surroundings would hasten his recovery. However, he continued to run fever, and no additional improvement was noticeable as the days went by. On September 19, 1881, at 10:35 in the evening, President Garfield died suddenly.

At the autopsy (99) it was found that death had resulted from a ruptured aneurysm of the splenic artery. It was conjectured that the bullet had grazed the splenic artery, producing a weakened area that resulted in the fatal aneurysm. The course of the missile was traced through the first lumbar vertebra, and the bullet was found in the abdominal cavity among the intestines (99), which had been removed early during the post-mortem examination.

Most of the best surgical opinions of the time were in agreement with the manner in which the President's injuries were managed. However, Sims, who was in Europe at the time, apparently permitted publication of interviews in which he said the President should have been celiotomized. Sims' contemporaries, generally, were not in accord with this opinion and some felt he should have refrained from allowing the publicity given his interviews.

President William McKinley

Late in the afternoon of September 6, 1901, while receiving the public in the Temple of Music at the Pan-American Exposition (92) in Buffalo, New York, President William McKinley was shot twice by Leon F. Czolgosz, who approached the President with his right hand wrapped in a handkerchief in which he held the pistol. As the President went to shake the assassin's left hand, the latter fired the first shot which struck the victim tangentially in the midsternum, only grazing the area, and failing to enter the chest. The second bullet, fired immediately after the first, entered

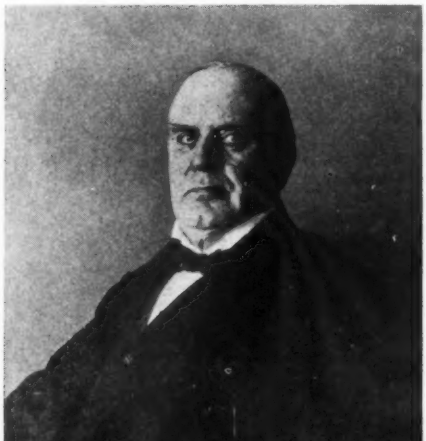

Fig. 20. President William McKinley. (Buffalo M. J., 1901–1902, 57: 227 (N.S. 41:)

the abdominal wall "5 or 6 inches below the left nipple and about 2 inches to the left of the median line." The assassin was stopped from doing further damage, and in a very few minutes the President was placed in the hospital on the Exposition grounds.

Shortly after the injury the President was operated upon by M. D. Mann, who was assisted by a group of other prominent surgeons. Many difficulties were encountered during the operation. In the first place, the hospital's facilities were not entirely adequate and there were not sufficient instruments for the celiotomy. Then there was the huge size of the victim, which made adequate exploration very difficult. Finally, as the operation was being completed the setting sun removed the best source of light, and an assistant surgeon was compelled to use a mirror with which he reflected the setting sun's rays into the operative field. When the operation was completed President McKinley was removed to the home of Mr. Millburn, President of the Pan-American Exposition.

The operation lasted 91 minutes. The surgeons first discovered a perforation of the stomach, and the opening in each wall was closed with continuous sutures. This required much time, mainly because of the President's size and the other difficulties already mentioned. Closure of the opening in the posterior wall of the stomach was accomplished by opening the lesser peritoneal sac, which made this part of the operation very difficult. It was at about this time that the President's condition appeared to grow worse, and did not warrant continuation of the operation. Accordingly, it was stopped, the abdomen was closed, the wound dressed, and the patient transferred to Mr. Millburn's home in an ambulance.

Treatment of President McKinley continued very energetically at the Millburn home. Several prominent surgeons, among them Charles McBurney, were called in consultation. A number of special nurses attended to the President's needs. After several days it seemed he would recover. However, toward the end of the week his condition grew worse and then went steadily and rapidly downhill. He died on September 14, 1901, at 2:15 in the morning.

The autopsy, performed by H. R. Gaylord, showed, in addition to the abrasion of the chest, perforations of the anterior and posterior surfaces of the stomach, which had been sutured; a peculiar and not fully explained condition of the superior surface of the pancreas, near the tail, which was possibly the result of injury by the missile and probably had much to do with the fatal termination of the case; a slight laceration of the superior pole of the left kidney; and possible injury to the left suprarenal gland.

Senator Huey P. Long

The late Senator Huey P. Long's importance in American History is based essentially upon the new and extraordinarily peculiar philosophy with which he had aroused the interest of the entire country, at a time when the United States was still very unsteady as the result of the devastations of a depression unparalleled in the history of this nation. This philosophy had made him a national figure of great prominence and his untimely death cut short a career which many believe would have meant much progress for the United States. On the other hand, many were of the opinion that he was a demagogue of unusual ability, and some felt certain that America was heading for a dictatorship with him as the dictator.

Because Senator Long was the victim of a penetrating gunshot wound of the abdomen, it has been deemed proper to include this case with the others briefly outlined. Thus far the writer has failed to find any report of this case in the medical literature. It is firmly believed that nothing of the case's surgical history has been published, except the incomplete and unreliable newspaper medical accounts of this tragedy. As none of

these have appeared sufficiently authentic to be reliable, the writer has had to contact each of the physicians who supervised, or in any way assisted in, the treatment administered. Dr. Arthur Vidrine, who was in charge of the patient but unable to give access to the hospital record, nevertheless discussed the case with the writer, who immediately afterward made notes of the necessary and important facts. Brief accounts of the surgical facts in the case were likewise given the writer by Drs. William H. Cook and Cecil O. Lorio, each of whom assisted preoperatively, as well as at the operation, and each of whom saw the Senator after the operation. A questionnaire sent to "Our Lady of the Lake Sanatorium," where Senator Long was treated, was adequately filled out and returned to the writer.

Although many in Louisiana are of the belief that Senator Long was the victim of a bullet wound received at the hands of his "panicky" bodyguards (50) during the "scuffle" which followed the approach of Dr. Carl A. Weiss toward Long, many others are nevertheless of the opinion that it was a bullet from the ".32 caliber Spanish make automatic" in the hand of the young doctor which entered the body of the Senator. Be that as it may, the fact remains that Senator Long was shot in the corridor of the Louisiana State Capitol at about 9:30 on Sunday night of September 8, 1935, as he left the Governor's Office.

The bullet which struck Senator Long entered just below the border of the right ribs anteriorly, somewhat lateral to the midclavicular line. The missile perforated the victim's body, making its exit just below the ribs on the right side posteriorly and to the inner side of the midscapular line, not far from the midline of the back.

Upon realizing the extent of his injury, the Senator, in company with several friends, hurried downstairs, got into an automobile and was driven to the hospital, which was only a few blocks away. There arrangements were made for an emergency laparotomy, with Vidrine in charge. While preparations were being made, Lorio assisted in the preoperative management and watched the pulse and blood pressure. Shortly after the victim's arrival in the hospital he went into profound shock and presented clinical evidence of internal hemorrhage. Finally, when the systolic blood pressure dropped to about 90 and the pulse rate climbed above 110, the Senator himself said, "Come on, let's go be operated upon" (31).

Under ether anesthesia the abdomen was opened by an upper right rectus muscle-splitting incision. Very little blood was found in the peritoneal cavity. The liver, gall bladder, and stomach were free of injury. A small hematoma, about the size of a silver dollar, was found in the mesentery of the small intestine. The only intraperitoneal damage found was a "small" perforation of the hepatic flexure, which accounted for a slight amount of soiling of the peritoneum. Both the wounds of entrance and exit in the colon were sutured and further spillage was stopped. The abdomen was closed in layers as usual.

Fig. 21. The late Senator Huey P. Long.

The postoperative course of the case continued steadily on the downgrade. Evidence of shock and internal hemorrhage appeared to become progressively worse. Sometime shortly after the celiotomy, Dr. Russell Stone of New Orleans suggested catherization and the urine was found to contain much blood. At this time Stone's opinion was that another operative procedure to arrest the kidney hemorrhage would certainly be fatal, and, as a matter of fact, advised against it. At about 1:30 on the morning of Long's death he was seen by Dr. P. Jorda Kahle, New Orleans urologist, who aspirated the right perirenal area, and upon withdrawing pure blood very easily, concluded that there was a massive retroperitoneal hemorrhage. By this time, there was evidence of a marked bronchorrhea, the patient was practically moribund, and any further surgery was deemed most inadvisable. The continuous intravenous drip was stopped. Although each of several blood transfusions seemed to result in a temporary improvement it was usually not long again before the

blood pressure began to drop and the pulse to become weak. By early morning of September 10, it was very obvious that further treatment would be useless. Hence, in spite of all efforts by an excellent group of physicians and surgeons, the Senator's condition continued rather precipitously on the downgrade, and he died at 4:06 in the morning on Tuesday, September 10, 1935, about 30 hours and 36 minutes after being shot.

Although Vidrine tried to get permission, Mrs. Long objected to an autopsy and consequently none was performed, despite the fact that a New Orleans pathologist was on the scene and ready at the time of Long's death. Death undoubtedly resulted from uncontrolled hemorrhage and shock. Lorio was later of the opinion that the renal vessels had probably been torn by the bullet in its course through the body. Certainly, without the energetic postoperative treatment, especially the frequent transfusions of blood, death would have very likely supervened much sooner. Although no autopsy was performed, the condition of the intraperitoneal viscera and other structures, and the course of the bullet—which was rather unmistakable because of the entrance and exit points—pointed rather suspiciously to an injury of the right kidney and possibly of the right renal vessels as the source of the hemorrhage. The fact that Senator Long died in slightly more than 30 hours, in spite of an unusually large number of blood transfusions, would seem to indicate that the injury to the vessel, or vessels, which undoubtedly continued to permit the escape of blood as fast as it was administered, was quite large.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Congenital Impatency of the Nasolacrimal Duct. DuPont Guerry, III, and Edwin L. Kendig, Jr. *Arch. Ophth.*, Chic., 1948, 39: 193.

The term, congenital dacryocystitis, is a misnomer since the dacryocystitis merely results from stasis and the underlying condition is an impatency of the nasolacrimal duct. The lacrimal system usually becomes patent throughout in the eighth intrauterine month. Twelve instances of congenital impatency were noted in a consecutive series of 200 newborn infants—an incidence of 6 per cent. In 10 cases the epiphora first appeared between the tenth and twelfth day after birth, but in 2 cases tearing was delayed 3 and 4 weeks respectively. Penicillin ointment instilled 3 times daily reduced the discharge, the conjunctival injection and the incrustation of the lids. In this series all cases cleared without probing, the longest interval being 5 months, the shortest 3 weeks. Involvement of the left side was predominant.

In a later series, 5 cases were observed in which the congenital impatency persisted after 6 months. Probing cleared the condition immediately. They advise the use of Bowman's No. 1 probe through the superior punctum. With slight upward rotation the probe finds its way into the sac and duct without forcing it. The inferior turbinate has been previously shrunken by adrenalin, and after the probe has reached the nasal floor, a submucous elevator is passed in the inferior meatus until the probe is encountered. A sharp metallic click should be heard and felt, unless the probe is covered with a cushioning layer of membrane. If such happens, the probe is vigorously rubbed with the elevator until bare metal is felt. After this, the Bowman probe is passed through the inferior canaliculus in order to be assured of the patency of that structure.

James E. Lebensohn, M.D.

Fat Embolization Involving the Human Eye. Milo H. Fritz and Michael J. Hogan. *Am. J. Ophth.*, 1948, 31: 527.

The greatest number of cases of fat embolism follow traumas of the soft parts of the body and, more particularly, fractures of the long bones of the lower extremities. Nontraumatic causes, such as diabetes, childbirth, or injections of oily substances, are undetermined. The marrow fat, source of most emboli, usually is liberated from the cells by direct rupture, as in a fracture or by concussion from a blow. The vessels in the bones are held within the rigid haversian canals, and do not collapse following the injury; the liberated fat enters these torn vessels during or following the injury. This fat passes through the venous system to the right side of the heart and pulmonary circulation, where fine emboli lodge in the capillaries of the lungs. Some of the fat may pass through into the general circulation and result in systemic emboli.

Two main forms of the disease may be encountered: the pulmonary—which may be either immediate, developing soon after the injury, or delayed, commencing the third or fourth day; and the systemic—with more particular involvement of the nervous system, leading to restlessness, excitement, delirium, convulsions, and coma. Death occurs in from 2 to 6 days.

Reports of ocular findings are extremely rare. Only one case was found in the literature (Evans, 1940). Another case is reported by the authors.

After the explosion of a gasoline stove, a 21-year-old soldier sustained multiple compound fractures of the long bones, ribs, and pelvis, in addition to rupture of the bladder, and was admitted to the emergency hospital in shock. After treatment of the latter, an open reduction of the tibia fractures was performed. Immediately following the operation, the patient's condition was good. Suddenly, the next morning, a very marked change took place. The patient was unconscious and reacted sluggishly to stimulation. Pupillary reactions were reduced. A flaccid paralysis of the arms, and a temperature of 102.5°F. were noted. Coma continued until the time of death.

The ophthalmoscopic examination, under mydriasis, showed in the fundi some round and oval, white, subretinal exudates surrounding completely both maculae and following the course of the main vessels; there were no hemorrhages. The macula in the right eye appeared cherry red. The diagnosis of fat embolism was made, based upon the following considerations: (1) the presence of fat in the urine; (2) coma in a man with multiple fractures; (3) coma in a man without signs of intracranial pressure; (4) an eye-ground examination which showed embolic phenomena involving the retinal vessels; (5) multiple petechial hemorrhages of the skin and conjunctiva; (6) chest films revealing a cotton ball appearance in the parenchyma of the lungs. The patient died on the tenth postoperative day.

The general pathology protocol reported a generalized fat embolization and a terminal pneumonia. The ocular sections were stained with sudan IV. The examination revealed some diffuse edema and round-cell infiltration of the ciliary body. Several small capillaries showed fat emboli. Several vessels, just beneath the choriocapillaris and near the optic disc, contained fat emboli. The principal changes in the eye occurred in the retina. Scattered, fine hemor-

rhages were noted in the nerve-fiber and ganglion-cell layers. Focal areas of secondary degeneration were seen in the inner portion of the retina; and, in and around these areas, the terminal arterioles and capillaries were dilated and contained fat emboli which stained with sudan IV. In some areas the capillaries had ruptured, and fat lay in the retinal stroma. A number of capillaries of the optic nerve also showed fat emboli.

MICHEL LOUTFALLAH, M.D.

General Treatment of Conjunctivitis (Tratamiento general de las conjuntivitis). RAUL ARTURO CHAVIRA. *Analecta med.*, Mex., 1947, 8: 1.

There is no general agreement regarding classification of the various forms of conjunctivitis. The author divides the subject into contagious, noncontagious, septic, atypical, and that due to avitaminosis. These groups are again divided into numerous subgroups based mostly on anatomicopathologic findings.

Treatment of these various conditions is prefaced by a dozen rules of therapy founded primarily on general principles of eye therapy, such as the use of cold compresses, guarding the orbit, the correction of systemic diseases, and the use of sedatives.

The description of the treatment of the specific forms of conjunctivitis includes a discussion of mucopurulent, purulent, membranous, granular, follicular, and primaveral types as well as those due to avitaminosis. Therapeutic formulas are given in each instance as well as general and special corrective measures. STEPHEN A. ZIEMAN, M.D.

Denig's Operation for Trachomatous Pannus. N. PINES. *Brit. J. Ophth.*, 1948, 32: 385.

Denig's operation is suitable for the third or fourth stage of trachoma when the disease is nearly quiescent in the conjunctiva but still active in the cornea, as evidenced by progressive and stubborn pannus formation. It consists of resection of a strip of conjunctiva at the limbus adjacent to the pannus, one-half as wide and as long as the involved area. It is important that all of the tissue to the episclera be removed. The defect is then covered with oral mucosa fixed with silk to the conjunctival, but not corneal, edges of the wound. The graft, if it takes, is pink and edematous at the first dressing and there is striking improvement in the clarity and appearance of the cornea.

The author discusses the rather considerable literature concerning the operation about which there is much controversy as to its benefit, whether the mucosa forms an impenetrable wall against the invading trachoma, and the fate of the graft.

Two cases are presented in which the operation caused improvement in a troublesome, recurrent, trachomatous pannus. Histological study of the graft in one of these patients 12 years later showed the structure of mucous membrane slightly modified by stunting of the papillae and acanthosis. In another patient a tremendous serpiginous ulcer occurring late in the course of trachoma, healed. Examination of the graft 19 years later showed the structure of mucous membrane. One case of trachomatous pannus aggravated by local irradiation was not improved by the procedure although the graft took.

The author recommends more frequent use of mucous grafts for any plastic operation of the trachomatous eye. FRANK W. NEWELL, M.D.

Degeneration and Regeneration of Nerves in Corneal Transplantation; an Experimental Study. HUMBERTO ESCAPINI. *Arch. Ophth.*, Chic., 1948, 39: 135.

The corneal graft in rabbits is insensitive to a light cotton touch for the first few weeks after operation. This insensitivity is also found in the 2 mm. of host cornea that surrounds the graft. Recovery of sensation was first noted at about the forty-fifth day. The intensity of response gradually increased till about the seventieth day, but never reached the normal threshold. Physiologic tests indicate that after keratoplasy 9 days is required for each millimeter of reinnervation.

When a corneal graft is cut, the severed corneal nerves undergo wallerian degeneration. Degenerative changes are also observed in the nerves of the host cornea in an area of about 2 mm. around the graft, and in this area both the degenerative and the regenerative changes progress more rapidly. In 30 days the majority of axons are no longer recognizable. Elongated nuclei are seen lying in a clear halo which occupies the space left by the disappearance of the myelin sheath. The plasmatic sheath is defined by the sheath of Schwann to which these nuclei belong. There is complete granulation of the nerve fragments. In 60 days the axonic débris has completely disappeared, the old nerves being reduced to empty tubes. Since no macrophagic reaction takes place, one may assume that the disappearance of the axonic débris depends exclusively on the Schwann cells.

To enter the graft the outgrowing axis-cylinders must pass through the organizing connective tissue at the line of junction of the graft. At the scar, growth proceeds slowly, the regenerating axis-cylinders taking a wavy course, the majority finally growing into the Schwann sheaths left empty by the disappearance of the old axons. As the number of regenerating axis cylinders increases, maturation takes place. This consists of an increase in the caliber of the axons and a realignment of the Schwann nuclei.

Reinnervation follows the same course in clear and opaque grafts, but in the opaque graft maturation is slightly retarded. The regenerative changes eventually result in complete histologic innervation of the graft. JAMES E. LEBENSOHN, M.D.

Anterior Lentiglobus. An Atypical Case. K. SEN. *Brit. J. Ophth.*, 1948, 32: 305.

The author presents a case of anterior lentiglobus, an extremely rare condition in which the lens has a

small globular projection at the anterior pole. It consists of clear cortex only, but the area becomes highly myopic and interferes with vision. The condition gets progressively worse and eventually an anterior polar cataract develops. The cause of the condition is not known. The anterior capsule of the lens may be weakened and allow herniation of lens cortex through the weakened capsule.

EARL H. MERZ, M.D.

The Capsular Complications of Cataract Extraction. CHARLES GOULDEN. *Proc. R. Soc. M.*, Lond., 1948, 41: 271.

The author considers the capsular complications of cataract extractions and the best method of overcoming them:

1. The capsular remnant may become adherent to the operation scar and in some cases glaucoma results. The remnant should be detached early with a blunt-ended knife through a keratome incision.

2. Opaque capsular membranes or after-cataracts may be of several types: (a) opaque lens fibers imprisoned between anterior and posterior capsular remains, (b) new gray lens fibers from proliferating subcapsular cells, (c) Elschnig's cells, (d) heavy, thick membrane following hemorrhage, and (e) thick membrane following infection.

The treatment may be any one of the following: (a) make a capsulatory incision in the thin membrane avoiding thick bands; (b) double needle knives may be used if it is feared that pull and tug on tough membrane may cause trauma; (c) a Wheeler incision may be made; or (d) a Ziegler needle knife may be used to incise a triangular hole in the capsule.

Care is taken not to penetrate through the posterior lens capsule and allow vitreous to mix with the lens material.

The author is firmly convinced that intracapsular cataract extraction will be a great help in reducing capsular complications. EARL H. MERZ, M.D.

Amblyopia ex Anopsia; a New Concept of Its Mechanism and Treatment. B. M. LAZICH. *Arch. Ophth.*, Chic., 1948, 39: 183.

According to the author, amblyopia ex anopsia results primarily from a deviation of the visual axis from the fovea to a point elsewhere on the retina where vision is less acute. If the patient uses the amblyopic eye to fix at a lighted ophthalmoscope bulb at about 1 meter's distance, it will be apparent that the corneal reflex is eccentrically placed, the distance from the visual axis being proportionate to the degree of amblyopia. The field in the stereocampimeter shows the blind spot in the amblyopic eye to be displaced in a direction that coincides with the displacement of the visual axis.

Treatment should aim at correcting the malprojection and restoring the true visual axis relationship of object to fovea. This is accomplished by exercises in eye-hand co-ordination. At first a large white board is presented on which are pasted vivid red discs, which with successive treatments decrease in diameter from 4 inches to ¼ inch. With the good eye occluded the patient attempts to place a thumb tack in the center of each disc. The tacks at the beginning are invariably outside the disc, and in the same relative position. To encourage eye-hand training the patient is permitted even to use his hands and feel his way into the disc. The next step is the copying of letters from a chart, pointing out each letter as copied. The illumination is by an intermittent flashing light, and the letters become progressively smaller as the vision improves. After 20/70 acuity is reached, the training is combined with a variety of exercises for the development of fusion.

Almost any age group can be treated successfully. Among the cases cited is that of a woman aged 41 years, with 20/400 vision in the amblyopic eye. At her ninth treatment she had second degree fusion and an acuity of 20/25-3.

JAMES E. LEBENSOHN, M.D.

Glaucomas. PETER C. KRONFIELD and H. ISABELLE MCGARRY. *J. Am. M. Ass.*, 1948, 136: 957.

The specific object of this study has been the establishment of the relationship between the course of the glaucomatous involvement of the optic nerve, and the prevailing range of tension in the various stages of glaucomas. The report is based on the observation in the Glaucoma Clinic of the Illinois Eye and Ear Infirmary of definite (not borderline) cases of so-called primary glaucoma in adults. The classification as to the stage of the disease was based entirely on perimetric findings. Three stages (early, moderately advanced, and far advanced) were distinguished and somewhat modified from Gjessing's three groups.

The report is based on 225 eyes with wide-angle, and 100 eyes with narrow-angle glaucoma. The ratio of success to failure of miotics was 27 to 88 or 31 per cent of successes in the wide-angle type, and 35 to 40, or 88 per cent, in the narrow-angle glaucomas, which showed that the miotics were much more effective as tension-lowering agents in narrow-angle than in wide-angle glaucomas. The dramatic course of narrow-angle glaucoma is apt to "scare" the patient and surgeon into early operation, which might have been made unnecessary by the application of stronger miotics. The chronic course of wide-angle glaucoma, on the other hand, is conducive to an attitude of procrastination on the part of the physician, as well as of the patient, especially if there is no rapidly progressive loss of field. This explains why 32 cases of wide-angle glaucoma were permitted to remain with tension not normalized for 5 years.

With regard to the results of surgical treatment, the results in the two groups are probably better than expressed by the statistics, the ratio of success to failure being 31 to 6 in the narrow-angle, and 34 to 22 in the wide-angle glaucomas. The large majority of the operations in narrow-angle glaucoma were iridectomies. The reason for this difference between the two types of primary glaucoma in response to therapy lies in the difference in mechanism. There

is good evidence to the effect that in narrow-angle glaucoma the trabecula canal of the Schlemm mechanism is and remains normal until the trabecular spaces are completely closed off from the anterior changer by goniosynechiae. The aim of the treatment is to keep the trabeculae accessible to the aqueous, which is easily accomplished with miotics or an iridectomy.

On the other hand, in the majority of wide-angle glaucomas the disturbance is probably due to impaired function of the trabecular canal of the Schlemm mechanism itself, and is therefore much more deeply rooted than in the narrow-angle glaucoma. Failure of miotics calls for an operation of the filtering type, the success of which is still dependent on factors not completely understood and not entirely under the control of the operator.

In wide-angle glaucomas, the course of the glaucomatous involvement of the optic nerve may be summarized as follows:

The eyes of stage 1 act as one would expect glaucomatous eyes to act, the course of the disease of the optic nerve showing a close dependence on the prevailing tension range, and the independence of the relationship being rare enough to be considered an exception. In stage 2 the striking feature is the large percentage (38) of further progression of the glaucomatous involvement of the optic nerve (in this group in which tension was normalized surgically). In stage 3, the further progression of the disease in tension-normalized eyes was still greater (50 per cent). Twenty-three per cent of the group in which the tension was not normalized showed the remarkable feature of endurance of high tension ranges without further loss.

In narrow-angle glaucomas, under conditions of non-normalization, the glaucomatous disease progressed rapidly to total blindness. Under conditions of normalization, the disease remained stationary during the 5 year period, and for longer periods in approximately 90 per cent of all tension-normalized eyes, irrespective of the stage at which the normalization took place. Further progression occurred in less than 10 per cent of the normalized eyes of stages 2 and 3, which is a strikingly low percentage compared to the wide-angle glaucomas. Therefore, it can be said that the later stages of glaucoma showed a strong tendency toward further progression of the disease despite normalization of the tension.

The type of operation that produced the normalization did not seem to be an important factor, as the three main types of operation (corneosclerectomy, iridencleisis, and cyclodialysis) were represented in about the same frequency in the surgically normalized eyes presenting further progression of the disease.

The very center of the visual field seemed to exhibit a specific resistance to glaucomatous disease. Its chances of survival (83 per cent) after normalization of tension were estimated and reported for the respective stages of the disease.

MICHEL LOUTFALLAH, M.D.

EAR

Some Clinical Phenomena of Deafness in the Light of New and Old Tests of the Ear. F. KOBRAK. *Arch. Otolar.*, Chic., 1948, 47: 113.

The author states that the otologist should test the hearing not only with audiometric tests but also with tuning fork and vestibular tests. These are especially important in the diagnosis of latent congenital deafness. The tuning fork tests which are important are:

1. Loudness test. The loudness of the patient's threshold for each individual tuning fork is estimated by the examiner.

2. Period hearing. The period during which the patient can detect a tone from each tuning fork is compared to the normal.

3. The audiometric provocative test. A loud audiometric tone is placed on the untested ear while a Rinne test is done on the opposite ear. The normal response on the tested ear is a negative Rinne test. This is because of the damping effect, on air conduction, of contraction of the middle ear muscles.

The author offers the following definitions: hereditary deafness is defined as those cases in which the next of kin show manifest deafness, and congenital deafness as those cases in which latent abnormality of the genes can be detected by special methods of diagnosis. In congenital deafness, the audiometric examination and loudness with tuning forks may be normal. However, period hearing with the 1,024 and 2,048 tuning forks may be less than one-half normal. Audiometric provocative tests may show a positive Rinne test instead of the normal negative Rinne test. Vestibular abnormalities are not infrequent.

An explanation is offered also for the false Rinne test in which a totally deaf ear manifests a negative Rinne test. It is believed that the apparent hearing by bone in the deafened ear is due to a cochleovestibular sensation because of some vestibular directional sensitivity. The older explanation of Shambaugh was that the hearing was tactile sensation via the trigeminal nerve. The author sites an experiment to support his contention. A medium intensity audiometer tone (d_7) is placed on the deaf mastoid. A loud tuning fork of a different frequency (e_1) is placed on the normal mastoid. The patient's sensation consists of the loud tone on the normal ear first, then two different frequencies laterized to the middle of the head and, finally, as the tuning fork dims, the only sensation is the medium tone of the audiometer in the deafened ear. WILLIAM K. WRIGHT, M.D.

NOSE AND SINUSES

Intranasal Extension of Sellar and Parasellar Neoplasms. STANTON A. FRIEDBERG. *Laryngoscope*, 1948, 58: 347.

Neoplasms arising in and about the sella turcica may invade the sphenoid sinuses, nasopharynx, and nasal cavities. The most common of these are the

pituitary adenomas and chordomas. In the 3 cases presented the diagnosis of the type of lesion was made by microscopic examination of tissue removed from the nasopharynx or nasal cavities.

Headache, primary optic atrophy, bitemporal hemianopsia, and alterations in the roentgenographic appearance of the sella turcica are characteristic of pituitary tumors. Chromophobe adenomas, comprising from 80 to 90 per cent of all pituitary tumors, produce generalized adiposity, diminution of secondary sexual traits, fatigability, a lowered basal metabolic rate, and an elevated sugar tolerance. Nasal obstruction, postnasal discharge, and occasional blood streaked sputum are the most common symptoms of nasopharyngeal or nasal extension of the tumor.

Complete removal of the tumor is impossible. Irradiation with roentgen rays and radium, or transfrontal, trans-sphenoidal, and paranasal surgical removal, alone or in combination, all have adherents.

Chordomas have their origin in vestigial remains of the fetal notochord. Cranial chordomas usually begin at the junction of the sphenoid and occipital bones in the region of the sella turcica. The microscopic picture is extremely variable. One of the diagnostic features is the presence of large vacuolated hyperchromatic cells. The signs and symptoms are those of a brain tumor or nasopharyngeal growth with headache, ocular disturbances, nasal obstruction or discharge, and epistaxis.

Radium and roentgen therapy are of no proved value for chordomas. Local recurrences are common; however, palliative relief may be achieved by removal of accessible tumor by surgical diathermy.

All patients with suspected anterior or middle cranial fossa tumor should have a careful nasopharyngeal examination. The necessity for microscopic study of all nasal polyps is again emphasized.

JOHN R. LINDSAY, M.D.

Benign Cysts of the Antrum, Originating from the Jaw or Teeth. W. A. NEWLANDS. *Laryngoscope*, 1948, 58: 402.

Radicular cysts and dentigerous cysts arising from the teeth may enlarge to encroach upon the maxillary sinus.

The radicular or root cyst has its origin in a root granuloma. The granuloma develops secondary to pulpitis. Cyst formation proceeds by dissolution of the center and connective tissue proliferation of the periphery of the granuloma. Further enlargement results in erosion of alveolar bone and invasion of the antrum.

Dentigerous cysts develop from the tooth sacs of retained or supernumerary isolated tooth germs. They develop around the crown of the tooth and may contain one or more deformed teeth projecting into the cyst space. These cysts have a dense fibrous tissue wall with areas of thin, shell-like bone, and a compact epithelial lining.

The surgical procedure found to be successful in the 2 cases presented was as follows:

The anterior wall of the maxillary sinus was exposed and opened through the canine fossa approach whereby the cyst was opened. The cyst lining was removed completely except that a portion of the floor was left undisturbed if its removal seemed liable to create a fistula through the palate or to disturb the blood supply to the adjacent teeth. A large nasoantral window was made. JOHN R. LINDSAY, M.D.

MOUTH

Langer's Lines and Facial Scars. LEONARD R. RUBIN. *Plast. Reconstr. Surg.*, 1948, 3: 147.

The author emphasizes the importance of skin lines for obtaining fine linear scars. It has been pointed out that an elective incision in direction with the lines would heal with little scar. Heretofore, the explanation was two-fold: a scar parallel to the lines would be inconspicuous because it resembled a line. The other explanation was the misunderstood thought that Langer's lines ran in the same direction as the muscles, avoiding pull on the wound edges. The first explanation holds, but the second does not. Actually, the muscle pull tends to separate the wound edges, widening the scar. This fact must be understood if cosmetic surgery is a prime factor. A scar against skin lines stands out prominently. Knowing the danger of muscle pull, the surgeon can take measures to overcome it by very careful suturing and postoperative care. Briefly outlined, the important things to remember in obtaining a fine scar are: (a) the suturing of all deep tissue in layers; (b) placing superficial subcutaneous sutures to take all tension off skin edges; (c) putting the finest sutures very closely together in the epidermis and removing them no sooner than 3 days. Since active healing is only starting at that time, the wound edges should be held by collodion strips (fine mesh gauze fastened by collodion across the wound edge). These strips should be applied and reapplied for at least 2 weeks, preferably 3. Constant care to have anatomical parts at rest, to avoid muscle pull, should be observed. LOUIS T. BYARS, M.D.

NECK

Proteolytic Activity in the Physiology, Pathology, and Therapeutics of the Thyroid Gland. Van Meter Prize Essay. E. DEROBERTIS. *West. J. Surg.*, 1948, 56: 253.

The thyroid gland stores its secretion inside the follicular cavity as a colloidal substance containing thyroglobulin, and the secretion released into the circulation is a continuous process, the velocity of which is governed by the organism's needs. With the freezing-drying technique, the author demonstrated that cytological products of secretion are located within the cells and reabsorption is always intracellular. Since, however, thyroglobulin is actually a macromolecule, its passage through the follicular epithelium cannot be explained on the basis of the ordinary concepts of cell permeability.

The author, therefore, tested the presence of proteases in the colloid extracted from single follicles of the rat thyroid. Under magnification and with micropipettes guided by a micromanipulator, a proteolytic enzyme, which digests a gelatin substrate, was obtained. Its activity was found to be increased in the acid range and diminished in the alkaline. Similarly, after the injection of thyroid stimulating hormone, proteolytic activity was heightened and after prolonged iodine administration it was decreased. The determination of the *p*H of the follicles by the microinjection of indicators showed no marked changes after the administration of thyroid stimulating hormone or iodides which could explain the variations.

This led the author to propose the theory of enzymatic reabsorption which postulates that enzymatic hydrolysis of the thyroglobulin into a product of lower molecular weight (probably an iodized polypeptide) makes possible reabsorption by the cells. Theoretically, it may be that the proteolytic enzyme is also involved in the synthesis of thyroglobulin.

The degree of proteolytic activity of normal and pathological human thyroid tissue was measured photometrically by determining the amount of liberated tyrosine and tryptophane on an edestin substrate at *p*H 4 and expressed as milligram equivalents of tyrosine per 100 mgm. of tissue. Under arbitrarily fixed conditions, the proteolytic activity of 10 normal glands yielded, on the average, 0.444 mgm. Under the same conditions, in 11 severe toxic goiters, the proteolytic activity was found to be about 96 per cent above that of the normal gland. In 2 cases of nodular toxic goiter a difference of almost 100 per cent was found between the proteolytic activity of the adenoma and that of the surrounding thyroid tissue. In 7 simple diffuse colloid goiters there was a decrease of proteolytic activity corresponding to 27.9 per cent of the normal. In 7 mild cases of toxic goiter in which the symptoms including the elevated basal metabolism rate were rectified by treatment with iodine, the proteolytic activity was decreased to about 26 per cent below the normal level. This led to the conclusion that the proteolytic system may play an important role in the physiopathology of toxic and simple colloid goiters.

That inhibition of proteolytic activity is the basis for the therapeutic effect of iodine is suggested by the results of experiments on rats and in mild toxic goiter. This may be due to an inhibition of the release of the colloid as well as of hormonal synthesis. In vitro studies indicate that direct iodization of the proteolytic enzyme may be the mechanism responsible for the inhibition. Similarly, radioactive iodine was found to inhibit the formation of diiodotyrosine and thyroxine.

Thiourea has no action on proteolytic activity but acts on a totally different mechanism, inhibiting the enzymatic system involved in iodization. It is suggested that the effectiveness of iodides, when given with thiocompounds, may be due to their interference with the action of thyroid stimulating hormone.

DAVID H. LYNN, M.D.

The Effect of Sex Steroids on Experimental Goiter and Iodine Storage in the Thyroid. F. X. GASSNER, H. W. BARRETT, and R. G. GUSTAVSON. *West. J. Surg.*, 1948, 56: 346.

The authors review the literature on the interrelationship between the thyroid, ovary, and pituitary, and conclude that experimental results are inconclusive and contradictory because of the elasticity of the physiological uilibrium in the normal animal, which makes it difficult to demonstrate mechanisms of inhibition or stimulation. The authors postulate that if a given organ can first be unbalanced by imposing stress, then subsequent inhibition or stimulation of that organ can be produced more easily. Experimental work is reported in which the effects of gonadal hormones on the thyroid were studied, after the thyroid was subjected to stress by maintaining the animal on a goitrogenic diet.

In the first experiment 30 micrograms of estrone were injected daily over a period of 12 weeks into normal female rats 8 weeks of age which were fed a moderately low-iodine goitrogenic diet. There was a highly significant decrease in the iodine content of the thyroid glands, the mild goiter occurring on the control diet was alleviated, the pituitary weight was doubled, and exophthalmos occurred unexpectedly in all of the rats after the third week of injections.

In the second experiment 40 micrograms of testosterone proprionate were injected daily over a period of 12 weeks into normal and castrated male rats 26 weeks of age which were fed a low-iodine goitrogenic diet. There was a highly significant decrease in thyroid iodine content in the normal animals and a nearly significant decrease in the castrated ones. Control castrated animals showed partly goitrous and partly atrophic thyroid parenchyma, with follicular degeneration. These changes were alleviated with testosterone. Pituitary enlargement following castration did not respond.

The writers suggest that pituitary hypertrophy in estrone-treated females is compensatory as a result of interference with either the production, secretion, or utilization of thyrotropin by excess estrone. This pituitary hypertrophy was not seen in intact males, despite a significant reduction in the thyroid iodine and a slight alleviation of the goiter. Therefore, the mechanism responsible for thyroid depression in the female either is not the same as in the male, or it is activated to a different extent.

S. LLOYD TEITELMAN, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Intracranial Aneurysm of the Internal Carotid. Operation. Cure. (Aneurisma intracraneano de la carótida interna. Operación. Curación.). GERMÁN HUGO DICKMAN, LEÓN ZIMMAN, and ALFREDO M. ZELASCO. *Cirugia*, 1947, 1: 44.

A 46-year-old, white woman awoke at 4 a.m. with intense pain in the left frontal and parietal regions. Ten minutes later blepharoptosis and amaurosis occurred on the left side. Examination disclosed also left sided anosmia, papilledema, anesthesia of the trigeminal region and paresis of the oculomotor, trochlear, and abducens nerves. During the preoperative stay in the hospital the ptosis diminished and vision improved, and the eye regained partial movement (inward rotation). However, the pains persisted and ear noises developed on the affected side. The condition was recognized as the syndrome of Rollet (paralysis of the second, third, fourth, fifth, and sixth cranial nerves), and under the diagnosis of intracranial aneurysm of the left internal carotid, the artery was ligated by the technique of Dandy. It was ligated first in the neck; 8 days later a left temporal flap of the skull was lowered and 2 silver clips were applied to the internal carotid artery where it was easily accessible alongside the optic nerve.

As the middle cerebral cavity was exposed, the cerebral tissues were observed to be under tension, the optic nerve was elevated, and the artery at this point was dilated with abnormal congestive conditions about it, so that it did not have its normal appearance but seemed to be inclosed in a thick mesh of congested vasa vasorum vessels.

Following the operation the symptoms of increased intracranial tension decreased immediately and the headaches became less severe, the mental condition of the patient returned to normal, and she was able to resume her occupation. The trigeminal anesthesia persisted and the eye movements did not entirely return to normal; the internal rotation has persisted and will be the object of eye-muscle surgery.

The authors think that this is the first instance of this condition with a successful surgical outcome in Argentina, and offer the report merely as an addition to the statistical material on the subject.

JOHN W. BRENNAN, M.D.

Cerebellar Abscess, Acute, Otogenic. N. ASHERSON. *J. Lar., Otol.*, Lond., 1948, 62: 278.

This extraordinary article is the report of 3 cases of cerebellar abscess. The author apparently reported 4 consecutive successful cases in 1942, thus making 7 consecutive cases of cerebellar abscess. Two additional cases are reported to illustrate what may happen to cerebellar abscesses. The present 3 case reports substantiate the previously reported 4 cases. The article consists of day-by-day reports and progress notes of these 3 cases.

The article opens with a discussion of early diagnosis of cerebellar abscess and a differential diagnosis between cerebellar and temporosphenoidal abscesses, and the following assertions are made:

1. When the cerebrospinal fluid pressure in the tranquil patient was below 200 mm. of water, the suspected brain abscess was below the tentorium (cerebellar).

2. When the pressure was above 300, the abscess was above the tentorium.

The cases since encountered confirm the postulates previously adumbrated.

It is believed that the most important sign, however, is persisting nuchal rigidity, which is regarded as the keystone of early diagnosis. Nystagmus and arm symptoms are next in order of importance. The invariable sequence is described as persisting nuchal rigidity, and, with the onset of dysdiadokokinesia, the diagnosis becomes certain.

The author believes that these cases should not be abandoned to the neurological surgeon. Early drainage once the abscess has been diagnosed is emphasized.

ADRIEN VER BRUGGHEN, M.D.

Pinealomas (Pinealomas). JOSÉ BENAIM. *Dia médico*, B. Air., 1948 20: 430.

The frequency of these neoformations is not great; however, they should not be considered exceptional.

The pathological forms are as follows: pinealoma spongioblastica, malignant pinealoma, teratomas or teratoid fibromas, sarcomas, gliomas, gliosarcomas, neurogliomas, neuroepitheliomas, carcinomas, adenomas, and cholesteatomas.

The symptoms produced by these tumors may be classified into the following groups: (a) intracranial hypertension, (b) localization symptoms, (c) endocrine, and (d) atypical. Radiological signs are present.

Intracranial hypertension is due to the occlusion of the sylvian aqueduct by the tumor; this results in an internal hydrocephalus which causes papilledema.

The symptoms of localization are ocular disturbances, impaired hearing due to the involvement of the posterior quadrigeminal tubercles and the lateral lemniscus, motor disturbances from pressure on the pyramidal tract in the medulla which produce weakness in one or both extremities, asynergy from pressure on the superior cerebellar peduncles, and symptoms of diabetes insipidus from invasion of the third ventricle.

Endocrine involvement results in an increase in size, with sexual prematurity before puberty, increase in the size of the external genitalia, increase in pubic hair, adult voice, and mental precosity.

Roentgenograms may show calcification of the gland with displacement. Pneumoventriculography

is of help in visualizing any obstruction to the aqueduct, while iodoventriculography is of some value. However, arteriography is of minor importance.

The situation of the pinealomas, rather than their histological type makes the prognosis very grave.

Treatment is surgical, radiological, or the combination of both. When the incision is made over the tumor, the excision is accomplished either through the corpus callosum or transventricularly. In the indirect intervention, either a decompression or a derivative type of intervention with re-establishment of the circulation of the cerebrospinal fluid is used.

The author reports 2 cases of pinealoma. In the first case the symptoms were typical with an early hypertensive syndrome, a pseudo-Argyll-Robertson pupil, bilateral mydriasis, the syndrome of Parinaud-asynergy of the trunk, involvement of the fifth, sixth, ninth, and twelfth cranial nerves, and cerebellar symptoms. X-ray examination revealed intracranial hypertension, while ventriculography revealed a large bilateral hydrocephalus.

In the second case there was some increased sexual development in a 17 year old male, having the syndrome of Parinaud, Argyll-Robertson pupil, and intracranial hypertension. The surgical result was good. ARTHUR F. CIPOLLA, M.D.

Diploic Epidermoid and Extradural Pneumatocele; Cranial Defects and Deformity. JOSEPH E. J. KING. *Ann. Surg.*, 1948, 127: 925.

Two uncommon types of cranial defects are discussed and detailed case reports of 4 patients operated upon by the author are presented. Diploic epidermoid and extradural pneumatocele of spontaneous origin each have a characteristic appearance in the roentgenogram and should be diagnosed before operation. The neurological findings, roentgenographic diagnosis, and operative technique are presented for each of the 4 patients. Reproductions of roentgenograms, as well as photographs of the patients and the surgical specimens, clarify the text.

Diploic epidermoids usually destroy the inner table of the skull and may perforate the dura before the outer table is destroyed. Islands of bone in the outer table represent areas in which bony destruction is not complete, and a dense, white, scalloped margin with bone destruction is characteristic on roentgen examination. The tumor does not invade the bone, but destroys by compression. The mass may occupy a relatively large amount of intracranial space, compared with the smaller diameter of the defect in the skull. The involved bone should be resected, and if the dura has been perforated a fascial transplant may be necessary. If the dura is not resected, the bone block may be reinserted after curettage and boiling of the bone segment. Repair of the bony defect should be deferred for several months in patients with larger defects in whom dural resection and fascial transplant is necessary.

Extradural pneumatocele of spontaneous origin without perforation of the skull is discussed and 2 cases are presented. The position of the internal opening of the air fistula sometimes is not known preoperatively. The author states that no other lesion produces such a coral rocklike picture of the skull. Uneven erosion of the skull occurs as a result of the air pressure, and in some places the skull is almost completely destroyed. The dura is usually adherent to the depressed cortex, and the author cautions against attempting to fix the dura to the bone. The involved segment of bone should be resected. After removing the bony spicules of the segment, it may be used to repair the cranial defect. The intracranial extradural opening of the air fistula should be found and closed with a fascial or muscle-fascia transplant. JOHN L. BELL, M.D.

PERIPHERAL NERVES

Cervicobrachial Pain. G. E. HAGGART. *J. Am. M. Ass.*, 1948, 137: 508.

Twenty patients with neck and arm pain were studied and divided into 2 groups: those with abnormal x-ray findings and those without such findings. The patients with the abnormalities revealed: cervical rib (3), cervical disc (3), degenerative arthritis (3), and cervicodorsal scoliosis (1).

The patients who revealed no abnormal x-ray findings presented: the scalenus anterior syndrome (3), the costoclavicular syndrome (3), and the hyperabduction syndrome (3). In one case the symptoms developed following trauma.

The method of treatment consisted in correcting vitamin B deficiency, the result of inadequate diet, by the administration of vitamin B complex three times daily. Mild analgesics were also used and, finally, faulty posture and occupational habits were corrected.

There is a short reference to some of the authors who have in the past contributed to the understanding of this type of pain, and there is reference to Wright's work on the hyperabduction syndrome. There is also a short bibliography.

ADRIEN VER BRUGGHEN, M.D.

SYMPATHETIC NERVES

Raynaud's Phenomenon and Atypical Causalgia; the Role of Sympathectomy. LEROY J. KLEINSASSER. *Ann. Surg.*, 1948, 127: 720.

The author limits his report to the role of sympathectomy in Raynaud's disease and atypical causalgic states. These conditions are characterized by marked vasospasm without obliteration of vascular channels. He interprets the presence of hyperhidrosis, coolness, cyanosis, cold sensitivity, and color changes as indicative of vasospasm. He believes the mechanism of vasospasm to be neurogenic and examines for it objectively by regional procaine block of the sympathetic ganglia. For the upper extremity, block of the stellate ganglion with 10 c.c. of one-half per cent procaine is done and for the lower extremity a single injection of 30 c.c. of one-half per cent pro-

caine is introduced through a 7 inch needle placed at a 40 degree angle to the sagittal plane in the region of the second and third lumbar vertebrae. Skin temperature determinations and clinical observations are made before and after sympathetic ganglion block.

A total of 20 cases of Raynaud's phenomenon were seen. Five of the patients were operated upon. The operations were preganglionic cervicodorsal sympathectomy and lumbar preganglionic sympathectomy. They were completely successful in 4 of the patients and only partially successful in the other patient. The author believes that a conservative attitude toward the surgical treatment of Raynaud's disease is proper and that sympathectomy should be done only in severe and rapidly progressive cases with sclerodermatous and ulcerative changes.

Sympathectomy has been successful for atypical causalgic states in which the pain does not limit itself to the anatomic distribution of an involved nerve, for patients in whom there has not been a long history of edema in the lower extremities, and for those who have a marked sensitivity to cold.

DANIEL RUGE, M.D.

MISCELLANEOUS

Myocardial Infarction Resulting from Surgical Removal of the Stellate Ganglion in Angina Pectoris (L'infarctus du myocarde accident de la stellectomie dans L'angine de poitrine). D. DANIELOPOLU. *Presse med.*, 1948, 56: 337.

Evidently Danielopolu warned, as early as 1922, that removal of the stellate ganglion for the relief of pain in angina pectoris would be fraught with dangerous consequences. This article is based on the work of others reported in the literature but principally the paper of Lindgren and Olivecrona in the *Journal of Neurosurgery*, in 1947. Lindgren and Olivecrona operated on 71 patients with angina pectoris selected from a group of 250, the operation consisting of the removal of the upper four thoracic and the inferior cervical ganglia. In a large proportion of the cases the operation was bilateral. Three patients died during operation and 8 developed myocardial infarction in the first 30 days after operation; 3 of the latter died. Thus, Danielopolu states that 15 per cent of the patients treated surgically for angina sustain myocardial infarction because of this operative procedure. He considers that the article of Lindgren and Olivecrona supports, and in fact establishes, his original contention.

The reason for the infarction lies in the function of the cardiac nerves removed by the operation, both sensory and motor nerves being removed. The motor nerves are coronary dilators and their removal leads to permanent vasoconstriction which is a serious element in coronary disease. Acute cardiac failure is also found more often in surgically treated patients although this condition is seen less often since all the patients with angina are no longer operated upon. A myocardial infarction in nonsurgical cases is produced so slowly that the collateral circulation has time to become established, whereas this does not occur in surgical cases. The operation of Olivecrona is compared to resection or simple removal of the stellate ganglia alone, and this is considered less objectionable for fewer accidents are said to occur. Certainly, the mortality rate is much lower in stellectomy than in the more extensive removal of the upper part of the thoracic sympathetic chain. According to Danielopolu, this is a matter of statistics in which nonsurvivors are not interested. He believes that there should be a close follow-up of these 71 cases, and he has little doubt that further complications will ensue. The relief of pain is not discussed.

ADRIEN VER BRUGGHEN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Present Day Criteria for the Treatment of Breast Cancer (Critério atual no tratamento do câncer da mama). ANTÔNIO PRUDENTE. *Rev. brasil. cancerol.*, 1947, 1: 11.

In this article the author reviews the evolution of the treatment in cancer of the breast and states that it is indicative of medical and surgical progress generally. Such progress embraces not only surgery itself, but likewise the fields of pathology, roentgenology, and endocrinology.

Breast tumors, with particular reference to malignant ones, can be grouped under the following clinical classification:

Stage 1. Tumor confined to the breast itself.

Stage 2. Axillary involvement with movable nodes.

Stage 3. Axillary involvement with fixed nodes.

Stage 4. Supraclavicular involvement with movable nodes.

Stage 5. Breast tumor fixed to the chest wall, with fixed supraclavicular nodes, cutaneous extensions, or distant metastases.

In brief summary, lesions in stage 1, particularly those of low grade malignancy histologically, can be treated by simple mastectomy accompanied by removal of the pectoral fascia. In young women a reconstructive or cosmetic type of mastectomy seems justified.

Tumors in stage 1 or 2 with higher grades of malignancy (histologic grades 2, 3 and 4) should be subjected to radical mastectomy (Halsted).

In stages 3 and 4, that is, tumors presenting a fixed axillary mass or accompanied by movable supraclavicular nodes, a more radical approach in the form of mastectomy and interscapulohumeral amputation is indicated. Supraclavicular dissection and resection of the axillary vessels as an extension of the Halsted type of operation should not be undertaken, because the result of such a limited approach in these cases is disappointing.

Electrosurgical techniques offer significant advantages provided that coagulated tissue of sufficient amount to interfere with wound healing is not produced.

Roentgen therapy is at its best when used to complement surgical treatment in the highly malignant types (histologic grade 4) of medullary carcinomas and papillary cyst adenocarcinomas. In inoperable cases it will bring about local and symptomatic improvement. Castration by x-ray treatment is indicated in far advanced cases with osseous metastases. It is simple to carry out.

Testosterone propionate used after mastectomy in stages 1 and 2 is considered to have produced better results than those obtained by mastectomy alone. Statistical references to the author's material in this regard are given. Gratifying relief was obtained in the inoperable cases from intensive treatment with testosterone propionate.

HIRAM T. LANGSTON, M.D.

TRACHEA, LUNGS, AND PLEURA

Bronchial Lavage (El lavado bronquial). BENNI NOCEDO. *Rev. med. cir. Habana*, 1947, 52: 527.

Even with the adjuncts of bronchoscopy and bronchography, the diagnosis of pulmonary tuberculosis in certain cases remains doubtful because of the lack of demonstration of the causal agent, the tubercle bacillus. This occurs even in patients raising sputum; but in patients who have no sputum, demonstration of the bacillus is more difficult, although gastric lavage is frequently employed as an aid. In an attempt to increase the number of patients in whom the tubercle bacillus can be demonstrated positively, the technique of bronchial lavage has been devised, organisms being found in material recovered from the tracheobronchial tree following induced coughing.

Abreu of Argentina first reported this work in 1944, although Castillo is said to have used the method in 1943 without publishing his results. The technique described here is essentially that of Castillo and is as follows:

With the patient supine but his head elevated, the base of the tongue, uvula, and pharynx are anesthetized with 2 per cent novocaine. A catheter is then introduced through the nose into the pharynx. The patient is placed with the suspicious side down and novocaine is then injected into the bronchial tree. After 5 minutes, from 20 to 40 c.c. of sterile physiologic serum are injected via the catheter into the tracheobronchial tree. The patient is thus caused to cough, and all of the expectorated material is collected. Particular attention must be paid to the amount of anesthesia produced so as not to suppress completely the cough reflex on the one hand, or to affect the reflex so little that the patient gags and swallows the material instead of aspirating it. The collected material is carefully mixed with alkali and incubated 24 hours. It is then centrifuged, washed, neutralized, recentrifuged, put on a slide, dried, stained, and examined for the presence of acid-fast bacilli.

The procedure appears to be indicated in patients with a suspicious pulmonary shadow but with no sputum or negative sputum, in patients having positive sputum previously but which has become negative on treatment, patients who by the usual methods are said to be cured or their condition inactive, the family members of patients with positive sputa, and patients with chest lesions that are diagnostic problems. The chief contraindication is found in patients with recent hemoptysis, although asthmatics in an acute crisis should not be subjected to the

procedure. No serious accidents or complications following the procedure have been reported.

The author reports 20 cases studied by bronchial lavage in which the usual methods had failed to demonstrate the tubercle bacillus. He found 19 of these to be positive on stained smears of the expectorated material, a percentage of 95 per cent. Thirteen of these had revealed no sputum, and 7 had repeatedly revealed negative sputa. Five patients had had gastric washings without successful demonstration of the bacilli. Among the 20 cases all types of pulmonary tuberculous lesions were revealed by means of the x-rays.

In the comparison of the positive results from bronchial lavage with those of gastric lavage, a review of the reported statistics shows a range of from 95 to 5 per cent positives, with an average of 47.2 per cent, for bronchial lavage, and a range of from 60 to 4.1 per cent positives, with an average of 32.22 per cent for gastric lavage. The author reports 95 per cent as the highest. He considers the method an extremely important one in the questionable and difficult cases but points out that further proof by inoculation of the collected material into guinea pigs is needed to confirm the results obtained by the stained smears. JESSE E. THOMPSON, M.D.

Tracheobronchial Tuberculosis (Traqueo-bronquitis tuberculosa). MANUEL RODRIGUEZ DUTRA. *Rev. otorrinolar.*, 1948., 8: 24.

This article presents a review of the experience in the management of tracheobronchial tuberculosis during one year. It represents 533 bronchoscopies in 342 patients. There was no significant difference in incidence between men and women. There were only 2 patients below 20 years of age.

The incidence of tracheobronchial lesions in this group was 74 cases, the largest percentage incidence occurring in the age group over 40 years (31.7%).

Bronchoscopy was not used routinely in all tuberculous patients. The principal indications were signs of bronchial obstruction, radiologic evidence of obstruction, unexplained positive sputum, or clinical evidence of inadequate bronchial ventilation as determined by the behavior of a pneumothorax. When the indication included clinical signs of bronchial obstruction, disease was seen in 51.2 per cent of the cases examined; in pneumothorax failures, in 36 per cent; and in cases with unexplained or persistent positive sputum, in 22.7 per cent. The contraindications to bronchoscopy were extensive laryngeal ulceration, severe hemoptysis, acute upper respiratory infections, and excessive dyspnea.

There appeared to be no correlation between the demonstration of tracheobronchial lesions and the duration of the disease, although such lesions were predominant in the cavernous type of pulmonary lesion (60.8% of demonstrable tracheobronchial lesions occurred in patients with cavernous lung disease).

The author points out that in this series, mere mucosal changes were not catalogued as definite lesions, only those cases wherein the presence of a bronchial lesion was unequivocal and definite being included. He classifies them into four types: (1) infiltrative (38 cases)—hyperplastic mucosal lesions not infrequently accompanied by epithelial erosion; (2) ulcerative (21 cases); (3) ulcerogranulomatous (11 cases); and (4) fibrostenotic (4 cases).

The lesions found corresponded in localization to that of parenchymatous disease quite closely. In 4 cases the lesion involved the trachea. The upper reaches of the bronchial tree were most frequently involved, and in only 1 instance was a lesion found on the side opposite the pulmonary disease.

The author emphasizes the importance of not exaggerating the seriousness of demonstrable bronchial lesions in denying the patient suitable collapse therapy. The mere presence of a visible lesion without definite obstruction need not necessarily preclude the adoption of such measures. These lesions were generally treated topically with 30 per cent silver nitrate and the author claims healing in 32 per cent, improvement in 28 per cent, no change in 34 per cent, and progression of the disease in 6 per cent. Electrocoagulation has been used with success, but because of its apparent propensity to produce heavy scars, stenosis may result. Promin given locally is ineffective. Ultraviolet light and radiation therapy were not used. Streptomycin has been used and dramatic results are cited, but its scarcity has precluded any adequate trial. The author reviews the arguments against the effective use of local treatment, but believes it is valuable, even if not the entire answer to the problem. HIRAM T. LANGSTON, M.D.

"Wet Lung"—An Experimental Study. ROLLIN A. DANIEL, JR., and WILLIAM R. CATE, JR. *Ann. Surg.*, 1948, 127: 836.

A series of carefully controlled experiments produced traumatic wet lung in mongrel dogs by both blunt trauma and tangential bullet wounds of the thoracic cage. The term "wet lung" denotes the accumulation of fluid in the lungs following accidental or operative trauma. The fluid consists of blood, transudates, exudates, or mucous in any combination. The phrase pulmonary edema, which in its strict sense implies an increase in interstitial fluid, often is loosely applied to the condition known as wet lung.

The pathologic picture is one of extravasation of blood in the lung and the transudation of fluid into the interstitial spaces, as well as the alveoli and bronchi. The amount of fluid produced in each experiment varied directly with the degree of trauma. The pulmonary fluid appeared rapidly after thoracic trauma; it was still present, in proportion to the trauma inflicted, at 24 hours and had largely disappeared at 72 hours. Even in those areas of the lung exhibiting no gross evidence of trauma, fluid could be demonstrated, frequently in considerable amounts. However, the greatest degree of pulmonary wetness was found in the areas of greatest hemorrhage in the traumatized lungs.

Intravenous infusions of isotonic sodium chloride in amounts and at rates of injection which have little effect on normal animals intensified the wetness of a slightly traumatized lung. Generalized pulmonary edema resulted. The authors believe that anoxia per se does not explain the wetness in grossly untraumatized areas of the lung following thoracic injuries.

Studies of the arterial oxygen saturations, hematocrits, peripheral venous pressures, peripheral arterial blood pressures, and the pulse rates in the experiments did not reveal variations of enough significance to explain the occurrence of generalized wet lung associated with localized areas of pulmonary injury.

In an effort to explain the occurrence of fluid in the nontraumatized areas of the lung, experiments were performed which indicated that generalized wetness following local trauma to the thoracic cage and the lung is in part a reflex neurogenic phenomenon.

ORVILLE F. GRIMES, M.D.

Pneumonoconiosis Due to Talc in the Cosmetic Industry. NATHAN MILLMAN. *Occup. M.*, 1947, 4: 391.

The report of a case of pneumonoconiosis due to talc, is presented. The author emphasizes the fact that, contrary to prevailing beliefs, prolonged exposure to talc in sufficient concentration is capable of producing generalized pneumoconiosis of the nodular type. The elements of silica and asbestos were eliminated as a cause of the penumoconiosis in this particular patient since there had been no exposure to these substances in any industry prior to his exposure to talc in the cosmetic industry. Also, the chemical analysis of the talcum powder revealed less than 0.5 per cent free silica. ORVILLE F. GRIMES, M.D.

Situs Inversus, Bronchiectasis, and Sinusitis—the Kartagener Syndrome. Report of 2 cases. (Trasposicion de visceras—bronquiectasia y sinusitis. Sindrome de Kartagener). JUAN MARTÍN ALLENDE and LÁZARO LANGER. *Cirugia*, 1947, 1: 176.

The association of bronchiectasis and true dextrocardia was first described in 1904 by Siewert, but few references to this condition appeared in the literature until Kartagener described the triad which bears his name, in 1933, consisting of situs inversus, bronchiectasis, and paranasal sinusitis. He reported 4 cases at that time, later collecting 7 more.

The literature on this subject, as well as that relating to the association of upper and lower respiratory tract disease, is briefly reviewed. The etiology of bronchiectasis cannot be given any more certainly under these circumstances than in its uncomplicated states, but it does seem that in persons with situs inversus, bronchiectasis may well appear more frequently.

The first of the authors' cases was a young man, age 17, with a long history suggestive of bronchiectasis. He had a transposition of thoracic as well as abdominal viscera, and clinical as well as roentgenographic evidence of maxillary sinusitis. Bronchography revealed a lower lobe bronchiectasis in the right chest, which contained in anatomical pattern a left lung. Lower lobe lobectomy was performed with relief of the symptoms.

The second case was that of a girl 14 years of age. Birth was complicated by atelectasis of the left lung. She presented a complete transposition of the viscera and clinical as well as roentgenographic evidence of maxillary sinusitis. Bronchography revealed bronchiectasis in the left chest, involving the middle lobe of what was in anatomical pattern a right lung. A successful lobectomy of the middle lobe was performed.

These patients were treated in 1946 and 1947, respectively.

Twelve references to the literature are given.

HIRAM T. LANGSTON, M.D.

Cancer of the Lung in the Female (Cáncer del pulmon en la mujer). ANDRÉS A. SANTAS. *Bol. Inst. clin. quir.*, B. Air., 1947, 23: 134.

It has long been known that pulmonary cancer is much more frequent in men than in women. Various authors report the incidence in women to be between 12 and 20 per cent, except in Argentina, where the figures are lower, ranging from 2.5 to 11 per cent. The author reviewed the 350 cases examined in the Institute of Clinical Surgery in Buenos Aires between 1933 and 1941 and found only 7 females, an incidence of 2 per cent.

The cause of the greater incidence of pulmonary cancer in men is unknown. The part played by tobacco and industrial occupations has long been discussed, but with the increased use by women of tobacco and the widespread employment during the war of women in factory jobs formerly occupied by men, there has been no reported equality or even increase in the relative incidence of pulmonary cancer in the female. In general, one must look to the fundamental biological differences in the two sexes as manifested in their specific hormonal secretions to account for the difference, but just how this comes about is unknown.

Bronchogenic carcinoma in the female has the same histologic characteristics as in the male. Epidermoid carcinomas, adenocarcinomas, and undifferentiated epitheliomas are recognized. There is disagreement in the literature in regard to the so-called endothelioma. Some authors consider it of vascular or pleural origin, while others consider it a bronchogenic epithelial tumor. Such a tumor differs from the usual carcinoma, however, in that it is more frequent in the female, grows slowly, rarely metastasizes, gives a rounded homogeneous shadow by x-ray, and is of low malignancy. One of the cases in the author's series was classified as hemangioendothelioma. Bronchial adenomas also appear to be more frequent in the female than in the male. A point of interest is that epidermoid carcinomas are relatively infrequent in the female, the adenocarcinomas being the predominant type. This fact cannot account for

the overall difference in incidence of pulmonary cancer in the female, however.

The author reports 7 cases of female patients with malignant pulmonary tumors among a total of 350 cases reviewed. In these neither tobacco nor industrial occupations were factors of significance. All of the women performed domestic duties. None suffered from any other chronic pulmonary disease. Five were from urban areas and 2 from semirural areas. Histologic proofs of the diagnosis were obtained in 6 cases, 3 by bronchoscopy, 2 by thoracotomy, and 1 by node biopsy. It was not possible to classify the type of tumor in 1 of these 6 cases. Of the remaining 5, 2 were adenocarcinomas, 1 was epidermoid carcinoma, 1 undifferentiated epithelioma, and 1 hemangioendothelioma.

Among the total cases in the women patients epidermoid carcinoma was found in 1.17 per cent, adenocarcinoma in 3.63 per cent, undifferentiated tumors in 6.25 per cent, and hemangioendothelioma in 100 per cent. Among the 5 cases, adenocarcinomas represented 40 per cent; however, the series is too small to warrant any final conclusions.

JESSE E. THOMPSON, M.D.

Carcinoma of the Lung. Factors Affecting Survival after Resection of Cancer of the Lung. RALPH ADAMS. *J. Thorac. Surg.*, 1948, 17: 306.

During the 15 year period ending December, 1945, the diagnosis of lung cancer was microscopically established in 182 patients at the Lahey Clinic, Boston. Fifty-six, or 30.8 per cent, of these were resectable. Of the 56, 8, or 14.3 per cent, died in the hospital. This hospital mortality has now been reduced to 5.1 per cent during the past 5-year period.

Analysis of factors involving the survival of the remaining 48 patients shows the following:

Duration of symptoms. Approximately 60 per cent of all patients survived one year following operation regardless of the duration of the preoperative symptoms. Thereafter, the rate of death with epidermoid cancer is directly related to the preoperative duration of symptoms. In cancers of other types the cell type is more important than the duration of symptoms.

Size of lesion. This does not affect the survival rate.

Type of operation. Thirty-five of the 48 patients were resected by pneumonectomy and 13 by lobectomy. The survival rate was equally good for each type of operation, but it should be remembered that patients with the more advanced lesions were treated by pneumonectomy.

Survival with respect to nodal involvement. The regional lymph nodes were involved in 18 of the 48 patients and not involved in 30. The absence of demonstrably involved nodes increases the patient's chance of being alive and well 5 years after the resection, three-fold.

Prognosis in relation to cell type. This is the most important singular consideration in the estimation of the prognosis after resection. In undifferentiated cancers less than a year of life may be expected. Patients with epidermoid carcinoma have the best prognosis of long survival. The longest survival with adenocarcinoma has been 3 years. Broder's classification of the epidermoid carcinomas is confirmed as a prognostic aid in this group.

FRANK B. QUEEN, M.D.

ESOPHAGUS AND MEDIASTINUM

On the Pathogenesis and Surgical Treatment of Esophageal Diverticula (Sobre la patogenia y tratamiento quirúrgico de los divértículos del esofago). L. PEÑA LOPEZ. *Rev. españ. cir.*, 1946, 4: 338.

Modern x-ray examination has been the main factor responsible for the increased frequency of recognition of esophageal diverticula, and has made possible a definite diagnosis of certain symptom-pictures heretofore undiagnosed.

Diverticula of the thoracic esophagus, apart from those due to traction from scarring arising in the hilar glands, are congenital in origin. When symptoms are severe enough to warrant surgery, they can be treated by inversion of the sac into the esophageal lumen, by excision of the sac and layer closure of the esophageal wall, or by Lahey's method of tacking the dome of the diverticulum superiorly to the side of the vertebral bodies, which allows it to collapse and prevents food from entering it. These diverticula are quite uncommon as compared with those of the cervical type.

The pharyngoesophageal diverticula are those most frequently encountered. The pathogenesis of these lesions is still disputed. They arise in the weak triangular area of the pharyngoesophageal junction. Many authors consider congenital defects or alterations in the musculature in this area as the basic cause of the formation of diverticula. Others have called attention to the inco-ordination or spasm of the cricopharyngeus muscle during deglutition, with continued intermittent pressure on the weak esophageal wall as a factor. Probably all these factors contribute, and over a long period of time the diverticula enlarge and begin to give their characteristic symptoms, consisting of regurgitation, dysphagia, bad breath, and, in later stages, compression of nearby structures—the recurrent nerve, sympathetic trunk, and trachea. Pathologically, these diverticula show inflammation, with the formation of polyps and papillary projections, ulcerations which may perforate, and malignant degeneration.

Lahey has divided these lesions into three stages: (1) that producing no symptoms, (2) that in which there are symptoms without obstruction, and (3) that with symptoms and esophageal obstruction. Ideally, they should be operated on in stage 2, and those in the asymptomatic stage should probably not be operated upon.

The early surgical treatment consisted of a one-stage excision of the sac but because of high mortality from infection, a two-stage procedure was gradually evolved. This two-stage operation has been

championed by Lahey. In the first stage the sac is freed, elevated with its dome superiorly, and exteriorized to allow for adhesions to seal off the mediastinum and fascial planes of the neck. At the second stage the sac is amputated and the stump either closed primarily or packed with a small piece of gauze and allowed to heal.

In recent years with the protection of chemotherapy and antibiotics the tendency has been toward a one-stage operation in which the sac is very carefully freed and amputated under strictest aseptic precautions; then a layer-by-layer closure of the esophageal wall is done. The results of this method appear to be just as satisfactory as those of the two-stage method and the second operative procedure is obviated. Under certain circumstances arising at the time of operation, the two-stage maneuver may appear preferable. The author describes in detail the case of a large diverticulum treated successfully in two stages.

JESSE E. THOMPSON, M.D.

The Treatment of Carcinoma of the Esophagus and Cardiac End of the Stomach by Surgical Extirpation. RICHARD H. SWEET. *Surgery*, 1948, 23: 952.

Because of the anatomic and physiologic aspects of the esophagus, surgery of this organ demands separate consideration, according to the various levels at which carcinoma occurs (Fig. 1). Surgery for carcinoma of the cervical segment of the esophagus utilizes a skin flap transplant. The operation is almost perfect from a standpoint of restoration of function, but is a failure as a measure of cure. Recurrence is inevitable, and prolongation of life cannot be insured.

Carcinoma of the thoracic segment involving the upper fourth of this region requires a thoracotomy incision through which the entire esophagus from the base of the neck to the cardia is dissected free, and the stomach is completely mobilized. An esophagogastric anastomosis is performed within the neck, above the level of the clavicle. Although the operation has limitations, it is the most effective palliative method thus far devised.

Surgery for carcinoma of the middle half of the esophagus includes lesions superior to the aortic arch and those inferior down to the level of the inferior pulmonary vein. A high esophagogastrostomy is employed in the reconstruction whereas a low esophagogastrostomy is used in resection of carcinoma involving the lower fourth of the thoracic esophagus.

After infection is eliminated, the most important immediate postoperative complications are cardiac arrythmias and congestive failure. Antibiotics have materially reduced the occurrence of infection. An intranasal catheter for the administration of oxygen has been most efficient. Continuous Levine suction of the stomach, aspiration of the thoracic cavity, and early ambulation have contributed to reduced mortality.

Radical resection for carcinoma of the esophagus offers the patient a survival in relative comfort without dysphagia. Appraisal of the operation as a curative measure awaits the accumulation of cases showing the accepted 3 to 5 year survival time. As a palliative measure the operative approach has a positive value, as demonstrated by the 203 resections reported.

STEPHEN A. ZIEMAN, M.D.

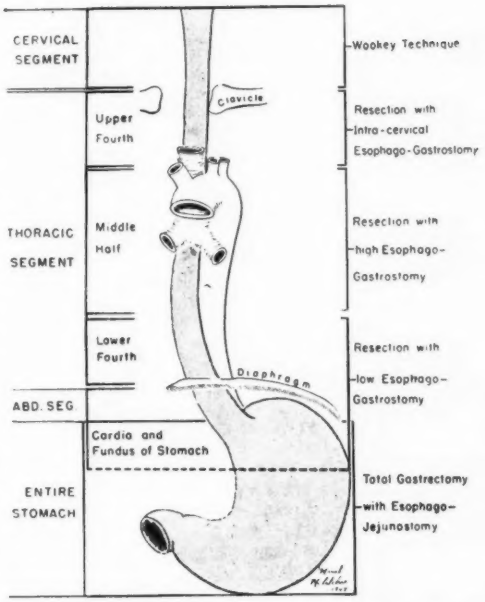


Fig. 1. (Sweet) Anatomic regions of the esophagus and cardiac end of the stomach illustrated to facilitate the understanding of the technical problems involved in the surgical management of carcinoma arising at various levels.

Cancer of the Cervical Esophagus. WILLIAM L. WATSON and JOHN L. POOL. *Surgery*, 1948, 23: 893.

The clinical material for this report consists of a consecutive series of 77 patients with cancer of the cervical esophagus admitted to Memorial Hospital, New York, in the 7-year period from 1940 to 1947.

The results of treatment for cancer of the cervical esophagus have been discouraging up to the present time for a variety of reasons. Dysphagia, the most prominent symptom of esophageal cancer at any level, is usually a late symptom, because it does not manifest itself until there is fixation of a large enough portion of the pliable esophageal wall to cause sufficient blockage of the gullet to interfere with the passage of food. The esophagus does not contain pain fibers, and, therefore, symptoms are necessarily due to pressure on adjacent organs and structures. Early in the disease, a feeling of roughness in the throat, halitosis, or slight vague and ill-localized discomfort on swallowing occurs. The patient is

likely to shrug off these premonitory symptoms. When the disease is finally diagnosed, the patient may be shuttled between the nose and throat specialist, the general surgeon, and the x-ray therapist, unless he falls, or is steered, into the hands of a physician particularly interested in this disease and capable of treating it.

The lesion under discussion occurs in the upper 10 cm. of the esophagus, thus including a portion of the gullet which extends into the thoracic inlet. Globus hystericus and thyroid disease are the two most frequent diagnostic errors encountered. The esophagus should be studied carefully under the fluoroscope, not only with a thick barium suspension in order to outline the gullet, but also to assess the mucosal pattern after the bolus has passed. Esophagoscopy should be carried out in every suitable case as the next diagnostic measure. When leucoplakia is present in the mouth, an investigation of the esophagus is not amiss, as there is a definite association of precancerous leucoplakia in the whole of the upper digestive tract. The Plummer-Vinson syndrome and carcinoma may be difficult to differentiate, and it is possible for the two diseases to coexist. In the series of 18 women, 3 had sufficient evidence to warrant the diagnosis of Plummer-Vinson syndrome. Other factors which may cause a disorder in the swallowing mechanism and which must be ruled out are: prominent osteoarthritic spurs of the lower cervical vertebrae in the elderly, a retropharyngeal abscess, tuberculosis of the cervical vertebrae, recurrent laryngeal nerve paralysis, and thyroid or lymph node enlargements.

If a patient with carcinoma of the cervical esophagus is put on a high caloric, supportive, liquid diet, the life expectancy is approximately 5 months. A satisfactory gastrostomy increases life expectancy slightly. In two-thirds of the cases, x-ray therapy brings about some degree of amelioration of the symptoms and at least allows saliva to be swallowed. The life expectancy of a patient after x-ray therapy and gastrostomy is more than a year, and an occasional patient may have complete arrest of the cancer.

There are three established methods of surgical attack on this problem of cancer of the cervical esophagus:

1. The Torek procedure is indicated in the high intrathoracic lesions, or those at the thoracic inlet. The cervical esophagus is brought out through the neck wound, the tumor excised, and the margin of the proximal esophagus sutured to the skin at a suitable level. A skin-lined anterior chest wall esophagus can be constructed later.

2. The radical operation for cancer of the cervical esophagus which invades the postcricoid region, the arytenoids, the thyroid gland, or trachea itself, and was described by Trotter, Eggers, and Wookey, each independently. It consists in resection of the larynx, esophagus, and the adjacent jugular lymph nodes en bloc. A preliminary gastrostomy is made, and a low tracheostomy is provided under local anesthesia to furnish an airway and an opportunity to introduce oxygen. At a later stage, the cervical esophagus is reconstructed by a skin-lined tube turned in upon itself and sutured to the two ends of the esophagus.

3. Segmental resection, a less radical resection, of the cervical esophagus is feasible when cancer has not extended completely through the muscular coat. This holds true even for those lesions at the cricopharyngeal pinchcock where the tumor is partially on the anterior wall. In such cases resectability without sacrifice of the larynx cannot be determined until exploration of the postcricoid space is undertaken. Lesions as low as the sternal notch can be resected in this manner. Preliminary gastrostomy may be indicated, and tracheostomy is essential.

Two methods are available for completion of the operation. If the lesion is particularly ulcerated and infected, the esophagus may be exteriorized by suturing a Padgett graft behind it. From 4 to 7 days later the involved segment of the esophagus is resected. The authors prefer to resect the esophagus at this stage and suture the superior and inferior stoma to the replaced skin flap margins. A graft is often needed over the prelaryngeal muscles, and, later, tubular reconstruction.

In this series there were 11 operations on the cervical esophagus in 27 cases, an operability rate of 14 per cent. In 7 cases (64 per cent) the tumor was resectable. Of the 7 patients resected, one died on the second postoperative day of pulmonary edema and myocardial infarction. The immediate convalescence of the other 6 patients was uncomplicated. Four patients were alive and well 7 years, 1 year, 9 months, and 6 months, respectively, after resection without recurrence. Two were alive with recurrence 3 years and 3 months, respectively, following surgery.

Cancer of the cervical esophagus, if discovered reasonably early in its course, can be cured surgically, and even when the disease is advanced and cervical metastases are present, a control of growth may be obtained by aggressive surgery plus substantial irradiation. HAROLD LAUFMAN, M.D.

Seven Resections of the Thoracic Esophagus for Carcinoma, with Esophagogastric Anastomosis, followed by Operative Cure (A propos de sept résections de l'oesophage thoracique pour cancer, avec anastomose oesophago-gastrique, suivies de guérison opératoire). ALAIN MOUCHET and PAUL ORSONI. *Mém. Acad. chir.*, Par., 1948, 74: 165.

During a period of 3 months, the authors saw 13 cases of malignancy of the thoracic esophagus. Four of the patients were inoperable, but 9, between the ages of 32 and 68, were operated on. Two of the latter died of shock and pulmonary edema; 7 presented an operative cure.

According to the site of the tumor, two different methods of operation were used. In the low tumors (4 cases) the left transpleural approach with resection of the eighth rib and section of the neck of the sixth and seventh ribs was used. The stomach was mobilized as far as possible toward the pylorus by severing the gastrocolic ligament. The coronary

artery was ligated in order to remove the lymph nodes at the small curvature. The esophagogastric anastomosis was performed at the anterior aspect of the stomach.

In the high tumors (middle esophagus, 5 cases) the technique of Garlock and Sweet was employed. This consisted of supraumbilical incision, liberation of the stomach, and ligation of the small vessels of the mesoesophagus at the level of the hiatus. Then the abdominal incision was closed, the patient turned on his left side, a right thoracotomy was done parallel to the sixth rib, and the tumor was dissected.

WERNER M. SOLMITZ, M.D.

Surgery of the Thoracic Esophagus (Sur la chirurgie de l'oesophage thoracique). F. D'ALLAINES and CH. DUBOST. *Mém. Acad. chir.*, Par., 1948, 74: 151.

Malignancies of the thoracic portion of the esophagus offer a poor prognosis in most cases because of early metastases in the mediastinal lymph nodes and invasion of the neighboring organs, and because of the poor general condition of the patient at the time a correct diagnosis is made.

At the convention of surgeons in Paris, 1947, the authors gave a report of 65 cases of their own observation. Fifteen of their patients were operated on, and only 1 of these 15 was alive and well 8 months after the operation. Since last year, however, improvement of anesthesia equipment and shock treatment have made the prospect less gloomy. Four cases in which operation was done since October, 1947 are described in detail. All of the patients survived.

If curative resection is impossible because of invasion of the lymph nodes and adjacent organs, palliative resection is preferable to gastrectomy. Although the patient cannot be saved in the long run, he can lead a comfortable life for some time and will not be subjected to the miseries of gastrostomy. The technique of palliative anastomosis between the esophagus and stomach without resection is described in detail, and six cases in which operation was done by this method are reported.

WERNER M. SOLMITZ, M.D.

Acute Posterior Mediastinitis from Per-Oral Wounds of the Esophagus (Les médiastinites aiguës postérieures par plaies endo-œsophagiennes). RAOUL JOUSSEMET. *J. chir.*, Par., 1948, 64: 180.

The author presents a 10 year study of acute posterior mediastinitis resulting from wounds of the esophagus via the per-oral route. Esophageal perforations were shown to occur as frequently from instrumental maneuvers as from the ingestion of foreign bodies. The esophageal wall, composed of only mucous and muscular coats without a serosal layer, is particularly vulnerable to traumatism. Perforations are most common in the cervical esophagus.

The anatomical arrangement of the several fascial planes leading into and away from the posterior mediastinum favors propagation of the infection with but little tendency toward localization. Likewise, the negative pressure within the thorax, the constant motion of the mediastinal structures from movements of deglutition of the esophagus, and the addition of infective agents from the saliva from repeated swallowing efforts tend to cause progression of the infective process. The abundant lymphatic supply of the posterior mediastinum is also a factor in the spread of infection introduced into the posterior mediastinum by endoesophageal wounds.

Two factors are important in the recognition and management of esophageal perforations incurred through the per-oral route:

1. The wound in the esophageal wall permits the entry of air into the periesophageal tissues which infiltrates along the fascial planes and along the great vessels. The presence of air is an important roentgen sign in establishing the diagnosis of an esophageal perforation.

2. The anærobic nature of the organisms from their natural habitat in the mouth and pharynx makes for an especially virulent symbiotic bacterial relationship.

The immediate surgical repair of esophageal wounds through an adequate approach, either cervical or high thoracic, is advocated by the author and is substantiated by favorable statistics.

ORVILLE F. GRIMES, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Chronic Eventrations and Voluminous Herniations. Preparation by Progressive Pneumoperitoneum. (Eventraciones crónicas y hernias voluminosas. Preparación con el neumoperitoneo progresivo. Procedimiento original). IVÁN GOÑI MORENO. *Cirugia*, 1947, 1: 129.

Since 1940 approximately 80 cases of large hernias and eventrations have been prepared preoperatively by progressive pneumoperitoneum. Patients with umbilical hernias, relatively small foramina, and flaccid ventral walls do not require preparation with pneumoperitoneum. However, the procedure gives its maximum benefit to those patients with large rings, tense abdominal walls, and, above all, those with postoperative eventrations.

The procedure as described has two principal actions: first, it reduces the disproportion between the abdominal cavity and its contents; second, it alleviates the respiratory changes attendant upon a rapid postoperative rise in intra-abdominal pressure.

Intraperitoneal insufflations of air reproduce, in miniature, the postoperative picture. At first there is an increase in the intra-abdominal pressure, elevation of the diaphragm, and labored respiration. For this reason the first administration of air necessitates prudence. The second and third "pneumos" are always well tolerated and the quantity of air may be markedly increased. Another significant fact is that the vital capacity is not diminished at the end of 2 or 3 weeks even though the abdomen is under extreme tension.

In 2 or 3 weeks after four or five administrations of progressively increasing amounts of air up to 6 or 8 liters, the patient has no more than slight discomfort, while if the same patient had received from 500 to 1,000 c.c. of air at the first treatment, he would have had reactions of abdominal tension, dyspnea, and pain in the left shoulder. The vital capacity of the same patient, which was 1,500 c.cm. before the initiation of treatment, dropped to 1,000 c.cm. after the first treatment; then it was augmented and established at between 1,500 and 2,000 c.cm. during the last treatment.

Upon opening of the abdomen under local anesthesia, the air is expelled and the patient experiences relief, the abdominal muscles are loose, and the viscera do not protrude. Ordinarily, spinal or general anesthesia are preferred.

The primary effect of the pneumoperitoneum is to reduce the edema of the peritoneal membranes, omenta, and adipose tissues, to exert pressure on the large dilated veins and as a consequence improve the venous circulation of the lower extremities, reduce distention of the viscera, elongate adhesions and weaken the muscular tension so that tissues may be approximated without strain when sutured.

Secondarily, as a result of the elevated intra-abdominal pressure due to pneumoperitoneum, there is strengthening of the diaphragm as well as of the other muscles of respiration, stabilization of the vital capacity during treatment, increase of the vital capacity after operation, and improvement of the venous return as a result of the improved thoracic respiration.

The procedure should not be used in patients of advanced age, in debilitated patients, in decompensated cardiopathies, or in strangulated hernias of many hours' duration. Notwithstanding, the procedure may be used in 90 per cent of the general cases of eventrations.

Besides the immediate advantages of the method, it provides an excellent test of tolerance for the operation. A patient who would be incapable of tolerating even carefully graded doses of air in the abdominal cavity, would not be a suitable candidate for the operative procedure. HAROLD W. BISCHOFF, M.D.

Mesenteric Thrombosis. J. E. MCCLENAHAN and BERNARD FISHER. *Surgery*, 1948, 23: 778.

In November, 1944 Ficarra reported 569 cases of mesenteric thrombosis with 35 successful resections. Since then no large series has been reported. A review of the literature since Ficarra's article adds 7 more cases with 3 successful resections. To these are now added 40 cases with 5 successful resections, bringing the total to 616 cases with 43 (7 per cent) successful resections. Since there was an average of 10,000 admissions per year at the Mercy Hospital, Pittsburgh, it was found that the incidence was 1 case in 5,000, or .02 per cent.

Of the 40 patients, 23 were men and 17 were women. All 40 were white persons, no negro receiving the diagnosis in spite of the fact that many were admitted. In comparing the incidence with other places it was found that the Michael Reese Hospital in Chicago had 44 cases in 10 years. The Kings County Hospital in New York had 35 cases in 8 years.

Although the incidence of mesenteric thrombosis is greatest between the third and sixth decades, this condition may occur at any age. In one series the youngest patient was 27 years old and the oldest 82. Of these cases, 57 per cent occurred between the ages of 40 and 60 years.

In a series of 40 cases, the diagnosis was definitely proved in 27, or 67 per cent, by either operation or autopsy. Of these 27 cases, 11 came to autopsy; 16 of the patients were operated upon, and 3 of these came to autopsy after operation. The remaining 13 cases, or one-third of the total, were diagnosed clinically and, of course, it was quite impossible to prove the diagnosis in that group.

The 13 cases of the condition not proved by operation or autopsy could be dismissed by saying that of this number, 12 patients died, a mor-

tality of 92 per cent. Of these 13 cases, 8 were the result of primary heart disease, 3 followed previous surgery, and 2 were primary in nature. Operation was not attempted in any of these cases because of the generally universal feeling by the surgeon that the patient could not tolerate surgery.

In the proved group of 27 cases, 19 patients were operated upon and 5 lived, a mortality rate of 73 per cent. In this group of 19, there were 6 in whom nothing but the diagnosis was established by opening and closing the abdomen. One cannot consider these individuals as having been operated upon in the ordinary conception of surgery. All 6 died. Of the remaining 13, upon whom some operative procedure was done, 5, or 39 per cent, lived. For all the cases in which some operative procedure other than just opening and closing the abdomen was performed the mortality rate was 61 per cent. For the group in which nothing was done, the mortality rate was 95 per cent. Thus, it would seem that surgery gives the patient about one chance in three to survive, while watchful waiting has little to offer but death.

Radical surgery, that is, wide resection and anastomosis, is the only tenable treatment in those cases in which there is extensive gangrene of the bowel.

The condition may often present itself in a mild form, not always as the severe accident as is so commonly believed.

The mortality rate of the patients in the Mercy Hospital was 61 per cent for those operated upon, and 96 per cent for the remainder. The total mortality rate was 85 per cent for 40 cases.

A brief discussion of the anatomy and pathologic physiology was presented, with emphasis on the collateral circulation.

An outline of etiologic factors was presented, and arterial thrombosis of arteriosclerotic origin was the most common cause of the condition in the series.

The presentation of 2 cases demonstrated the clinical picture of this condition. The signs and symptoms are not consistent.

It is believed that the use of heparin and dicumarol must be considered. They may possibly be of great value postoperatively. HARRY W. FINK, M.D.

GASTROINTESTINAL TRACT

Cardioesophageal Cancers Treated via the Transthoracic and Transdiaphragmatic Route. FELIX DE AMESTI and ELISEO OTAIZA. *Surgery*, 1948, 23: 921.

In 39 patients with cardioesophageal cancer who were treated by the authors between September, 1943, and September, 1946, it was possible to perform radical operation in 14 (36 per cent). All of the lesions of the distal third of the esophagus or cardioesophagus were explored through the thorax by resection of the ninth rib and incision in the diaphragm. Nonresectable lesions were (1) those tumors which at exploration of the thorax were accompanied by hemorrhage freely collected in the pleural cavity, neoplastic nodules disseminated in the pleura, (2) adhesions en bloc with the diaphragm indicating an immovable tumor and very extensive infiltration, extensive invasion of the neighboring organs such as the aorta, bronchus, spinal column, and (3) those which, after incision of the diaphragm, were shown to be accompanied by liver metastases, implants in the adjacent peritoneum or the pouch of Douglas, and extensive infiltration of the omentum or other intra-abdominal organs.

The anesthetic was cyclopropane in each case and was administered by tracheal intubation.

Following 14 radical resections there were 6 survivals (43 per cent of the resections or 15 per cent of the total). The average survival time was 13 months among these patients.

The cause of death in those who underwent resection and died during the first 30 days after operation was acute pleuropulmonary infection (in 6 patients). In all, autopsy revealed partial separation of the sutures of the anastomotic stoma. One patient died from operative shock and another of generalized peritonitis also due to separation of the sutures.

Commenting on their experiences, the authors emphasize the low resectability rate, the route of primary exploration, the determination of macroscopic evidence of delimitation of the tumor, and the fact that the suture line in the anastomosis is apt to disrupt. For the latter it is suggested that fine silk Halsted sutures be employed in the posterior part joining the gastric seromuscular layers with the esophageal muscularis layer. A continuous chromic 00 catgut suture on an atraumatic needle is used by these authors to include all the gastric and esophageal layers in the posterior part. The same method is then used in the anterior circumference. Fine silk Lembert sutures are used for reinforcement in the entire circumference. The stomach should be fixed in the thorax at the edge of the diaphragm. A Levine tube, passed above the anastomosis, was used for 5 or 6 days. Tension should be avoided on the anastomotic line. HAROLD LAUFMAN, M.D.

The Roentgen Diagnosis of Cancer of the Cardiac Region of the Stomach. ROBERT S. SHERMAN. *Surgery*, 1948, 23: 874.

Since gross pathology is the foundation for reliable x-ray diagnosis in gastric cancer, a classification based upon morphology is used. Three types of carcinoma are recognized: polypoid, infiltrating, and ulcerating. While most carcinomas contain more than one of these features, one usually predominates and permits classification. The diagnosis of an organic lesion roentgenologically is generally less reliable than its detection.

It is occasionally a problem whether a malignant tumor is of lower esophageal or of upper stomach origin. Mere identification of the bulk of the cancer above the diaphragm does not assure that it is esophageal, since intrathoracic gastric cancer is not uncommon. In the experience of the author most cancers involving the lower esophagus are found to

be of stomach origin. The various forms and degrees of herniation of stomach through the diaphragm may provide a stumbling block to the diagnosis of cancer of the cardiac region. One must exclude the possibility of intrathoracic gastric cancer in all hernia cases. In the obstructive lesions occurring at the lower esophageal orifice, it is important to get enough barium into the stomach to be able to rule out gastric cancer. To accomplish this, the period of the examination may have to be considerably extended. If an air bubble is present, a careful study of its contour may provide essential information.

In a group of 205 resected carcinomas of the stomach at Memorial Hospital, New York, it was found that 22 per cent were located in the cardiac region. The author discusses the diagnostic details under the following headings: (1) mucosal alteration, (2) infiltrate, (3) mass, (4) ulcer, (5) esophageal involvement, and (6) miscellaneous findings, such as obstruction, gross contour changes, general widening between the fundus and the dome of the diaphragm, lateral displacement of the stomach at the cardia, and diaphragmatic alteration.

In checking the pathological specimens with the roentgen diagnosis, it was found that the judgment of the roentgenologist as to tumor size was about 50 per cent dependable. As for location, all ulcers involved the cardia to some extent, and most of them had the cardia as their principal site.

It is emphasized that postoperative roentgenography should be used in the detection of recurrences.

HAROLD LAUFMAN, M.D.

Surgical Treatment of Cancers of the Gastric Cardia. GEORGE T. PACK and GORDON MCNEER. *Surgery*, 1948, 23: 976.

This article is a summary of gastric cardiac surgery carcinoma as done in the Memorial Hospital, New York, New York. One hundred and twenty-two cases are listed, including 65 cases of the author.

The procedure followed is given in detail from the first presentation of the patient for diagnosis to the postoperative follow-up. The anesthetics of choice are cyclopropane, ether with nitrous-oxide-oxygen, and ethylene. The abdominal approach was employed in 10 patients, the transthoracic in 45, the abdominothoracic in 6, and the transthoracic with total resection in 4.

The end-results were admittedly discouraging. Twenty-one patients succumbed as a direct result of the operation. Twenty-one others died from the continuance of the growth and metastases of the cancer. Of the remainder of the patients who are living, 18 are without evidence of recurrence.

STEPHEN A. ZIEMAN, M.D.

Transthoracic Gastric Resection for Lesions of the Cardia of the Stomach and Lower Part of the Esophagus. JOHN H. PAYNE and O. THERON CLAGETT. *Surgery*, 1948, 23: 912.

The authors present a review of the cases in which transthoracic gastric resection was performed at the Mayo Clinic, Rochester, Minnesota, for lesions of the cardia of the stomach and the lower part of the esophagus.

According to the authors this operation offers the best method of surgical management of malignant lesions of the lower part of the esophagus and the cardia and upper part of the fundus of the stomach.

Simple transthoracic exploration performed by the authors has not resulted in any deaths. Their immediate postoperative mortality rate for the cases in which resection was performed was 13 per cent.

Although the numbers are small, calculation by the actuarial method of Berkson indicates the following survival rates: 71 per cent of the patients lived for 1 year, 40 per cent lived for 2 years, and 31 per cent lived for 3 years.

Perforated Gastric and Duodenal Ulcers. Statistics on 95 Observations (Ulceras gástricas y duodenales perforadas. Estadística sobre 95 observaciones). P. LARGHERO YBARZ, L. M. BOSH DEL MARCO, L. MEROLA, AND F. GUIRIA. *Arch. urug. med.*, 1947, 31: 164.

Larghero *et al.*, in a series of 95 cases of perforated gastric and duodenal ulcer studied in Uruguay, found a gross mortality of 20 per cent. The cases were divided into three groups: in the first group were 52 cases observed from 1930 to 1940 with a mortality of 29 per cent; in the second were 29 cases followed from 1940 to 1944 with a mortality of 6.8 per cent, and in the last there were 14 cases followed from 1944 to 1946 with a mortality of 14 per cent. The authors found that the prognosis of these perforated cases depended on the time lost before the repair of the perforation was made. The prognosis is considerably more severe in cases with a perforation of longer than 15 hours' duration.

In the diagnosis of the perforations the authors found that pneumoperitoneum was present in all 6 cases of perforated gastric ulcer in which roentgenograms of the abdomen had been taken, but it was evident in only 20 of 30 cases of duodenal ulcer. In the group of cases without roentgenologic evidence of pneumoperitoneum, the perforation occurred in less than 4.5 hours in 7, in 7 hours in 1 case, in 7.5 hours in another, and in 17 hours in the last case.

The type of surgery used was as follows: suture of the perforation in 43 cases with 11 deaths; suture and gastroenterostomy in 31 cases with 5 deaths; and gastrectomy in 7 cases with 1 death.

The authors also discuss the importance of the different types of anesthesia and the type of drainage as important surgical factors in decreasing the mortality of patients with perforated ulcers.

WILLIAM E. RICKETTS, M.D.

Pathologic Perforation of the Ileopelvic Colon (Perforación patológica del colon ilio pelviano). JULIO V. URIBURU. *Cirugia*, 1947, 1: 73.

Uriburu discusses perforation of the ileosigmoid colon in pathological conditions. The author analyzed the history, pathological anatomy, etiology,

pathogenesis, anatomopathology, symptoms, diagnosis, and surgical indications of these perforations of the ileosigmoid colon.

According to the author, the principles fundamental in the treatment of these types of perforations are: suture of the communication between the perforated intestine and the free peritoneum, drainage of the intestine and the peritoneum, and the antiinfectious treatment with sulfa drugs and penicillin. Of 4 patients treated by the author 3 survived. Two of them had free perforations in the peritoneum, and 1 had a "blocked" perforation; in the fourth perforation was considered "imminent."

WILLIAM E. RICKETTS, M.D.

Tuberculosis of the Appendix (La tubercolosi dell' appendice). PASQUALE FICARA and UGO PAOLANTONIO. *Ann. Ist. Osp. Aquilani*, 1946–47, 1:277.

The authors analyze 238 appendectomies performed at the Civil Hospital, in Aquila, Italy. Of these, 200 represented patients operated upon for appendicitis (without perforation) and upon whom bacteriological, cultural, and histological studies for tuberculosis were made and all were found to be positive in 2 cases. One of the latter showed calcified nodules, pinhead in size on the cecum, while the other showed no evidence of tuberculosis. Hence, the authors concluded that primary tuberculosis of the appendix could be ascribed to only 1 case, representing 0.5 per cent.

The other 38 cases represented those in which there was macroscopic evidence of tuberculosis either locally or in the adjacent organs. In these cases the following procedures were carried out:

Exploratory laporatomy	8
Appendectomy	19
Hemicolectomy and ileotransverse colostomy	3
Hemicolectomy in patient with previous ileotransverse colostomy	1
Appendectomy with hysteropexy	1
Appendectomy with hysteroadnexectomy	4
Excision of fecal fistula	1
Opening and tamponade of caseous abscess	1
	38

Twenty-eight patients were cured, 7 showed improvement in their condition, and 3 died. The authors arrived at the following conclusions:

1. The preoperative diagnosis of tuberculosis of the appendix is almost impossible. It can be suspected in cases in which there are manifestations of tuberculosis elsewhere.

2. Primary tuberculous appendicitis is very rare.

3. Secondary tuberculous appendicitis is more frequent than the primary type but is not as frequent as reported by other authors.

4. Simple appendectomy has shown good results; in only 1 case did a fecal fistula develop. Among the cases secondary to ileocecal tuberculoma (4), there was 1 death due to intestinal obstruction. Of those secondary to adenexal conditions (4), there was 1 death due to general spread with tuberculous meningitis.

As regards operative procedures the authors state the following:

1. Simple inspection should be done in the presence of diffuse miliary or nodular lesions of the peritoneum.

2. Appendectomy should be done in cases in which the lesions are prevalent over the appendix and the remaining visceral and parietal peritoneum shows few tubercular nodules.

3. Right hemicolectomy followed by ileotransverse colostomy should be done in cases of tuberculoma of the cecum.

4. Appendectomy and hysteroadenexectomy are the proper procedures in cases in which the adnexal tubercular lesions are extending into the appendix.

The authors believe that their favorable results indicate that the pessimism of other workers is excessive when they insist on the necessity of respecting the appendix in the removal of tuberculous lesions.

LUCIAN J. FRONDUTI, M.D.

Sulfonamide Therapy and Abolition of Drainage in Perforative Appendicitis with Purulent Peritonitis (Sulfamidoterapia e abolizione del drenaggio nelle peritoniti purulente da appendicite perforativa). PARIDE STEFANINI AND PASQUALE FICARA *Ann. Ist. osp. Aquilani*, 1946–47, 1: 261.

The literature is reviewed and reference is made to authors recommending drainage and nondrainage for perforative appendicitis with diffuse or localized peritonitis.

The authors then record their experience with appendicitis. From April, 1940 through the year 1945, 200 cases of acute appendicitis with perforation, 43 with diffuse peritonitis, and 157 with circumscribed peritonitis were seen. All these were treated by appendectomy and drainage with a rubber gauge drain. In 19 cases of the localized peritonitis group the appendix was not removed.

During 1946 the authors treated 11 cases of acute appendicitis with diffuse peritonitis and 36 with localized peritonitis, following a standardized routine as much as possible. In this series of cases all patients with acute appendicitis were operated upon immediately regardless of the stage of the disease. Local anesthesia (20 cases) was the most common, followed in order by ether anesthesia (13 cases), sodium pentothal anesthesia (12 cases), and spinal anesthesia (2 cases).

A McBurney incision was used in all cases. After the appendectomy was completed 5 gm. of sulfonamide were injected into the peritoneal cavity and spread with the fingers. At first powdered sulfadiazine was used; later crystalline sulfadiazine furnished by the Americans was used. This was followed by closure in layers without drainage.

Postoperative care consisted of the intramuscular injection of 1 gm. of sulfadiazine every 3 hours or 8 gm. in 24 hours. In children the dose was reduced to 6 gm. a day or 1 gm. every 4 hours. This was con-

tinued until defervescence. The maximum total dosage was 36 gm. as a rule, only 1 patient receiving 59 gm., and the average dose was from 20 to 24 gm. During the first days large doses of plasma and physiologic serum are used.

The postoperative course was much better than when drainage was used. There was 1 death among the cases of generalized peritonitis and no deaths among the localized cases. Complications were not frequent. Wound infections developed in 12 cases. There were 3 cases of pelvic abscess, 1 among the cases of generalized peritonitis, in which case the only death resulted. There were no cases of obstruction as contrasted to 7 cases among the 200 patients treated with drainage. Other complications in the latter series with drainage were iliac abscess (1), subphrenic abscess (1), evisceration (1), pneumonia—fatal (2), pulmonary embolism—fatal (1), and phlebitis of the lower extremities (2); none of these complications were seen among the cases without drainage. The average length of illness was reduced from 23.9 to 11 days for the patients with generalized peritonitis and from 21.17 to 9.6 days for those with localized peritonitis.

The authors conclude that the improvements in the second series were due to the abolition of drainage and secondarily to the use of sulfadiazine.

LUCIAN J. FRONDUTI, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Clinical Studies of Liver Function. The Hepatorenal Syndrome. C. ROBERT SCHMIDT and V. E. CHESKY. *Am. J. Surg.*, 1948, 75: 772.

The present study was undertaken with the view of evaluating certain preoperative and postoperative therapeutic measures directed at improving the functional state of the liver in critically ill, poor risk, surgical patients. Because of the high incidence of associated renal and hepatic insufficiency (hepatorenal syndrome) following operation, an evaluation of the role of the liver in postoperative morbidity and mortality must of necessity include serial studies of both renal and hepatic function.

Vital organs, of which the liver and kidneys are examples, are characterized physiologically by large functional reserves—large factors of safety. It has been estimated that but one-fourth of the parenchyma of these organs functioning normally is sufficient to carry out bodily functions. Decompensation follows when functional reserves are exhausted. Laboratory tests fall into two categories: function tests, such as the hippuric acid and urea clearance tests, and decompensation tests, such as determinations of nitrogenous retention or the quantitation of icterus. The former give insight to the state of functional reserve. The latter give an idea of severity of parenchymal damage in an organ whose functional reserve has been depleted. There is no justification for the assumption that liver and kidney function are "normal" in a patient who is not jaundiced and whose nonprotein nitrogen is within normal limits. This situation obtains not infrequently in patients who are without functional reserves and who are thrown immediately into decompensation by insult that would ordinarily be considered insignificant. Yet much of the present knowledge of the hepatorenal syndrome springs from such a premise.

Considerable supportive evidence of a postoperative liver-kidney relationship is indirect. In many instances conclusions have been reached by a priori interpretation of hospital records and necropsy material. The functional state of the organs under indictment prior to the onset of pathologic decompensation was problematical or unknown. This is particularly true of kidney function. Bartlett has called attention to this shortcoming. Before postoperative renal insufficiency can be attributed to extrinsic origin appropriate tests which demonstrate previously existing normal renal reserve must be on record. There is a paucity of such data in hepatorenal literature.

The liver plays an important role in postoperative morbidity and mortality. Patients with evidence of subnormal liver function who responded poorly to specific measures directed at improving hepatic function were poorer surgical risks than those who responded favorably.

Patients who developed hepatic and renal insufficiency following surgery usually gave evidence of subnormal renal reserve prior to operation.

Diminished renal reserve plays a greater role in the development of the hepatorenal syndrome in surgical patients than is generally recognized. Knowledge of the blood nonprotein nitrogen is without information on renal reserve until such reserves have been depleted.

Transitory fall of blood pressure and anoxia in poor risk surgical patients should be anticipated during and after surgery. Preventive treatment is the most effective treatment of circulatory collapse.

Decholin sodium appears to have produced favorable results in the treatment of postoperative hepatic and renal insufficiency.

BENJAMIN GOLDMAN, M.D.

Anoxia and the Liver, with Special Reference to Shock and Chronic Malnutrition. J. GILLMAN and T. GILLMAN. *S. Afr. J. M. Sc.*, 1948, 13: 11.

The authors have made a very detailed and important study of the fat and glycogen-free vacuoles found in liver cells under certain conditions. Acute anoxia from any cause results in the appearance of these vacuolated cells in the liver within a few minutes of the onset of the anoxic state; the vacuolated cells are the morphological expression of a disturbance of liver metabolism due to anoxia or shock of any cause. This serves to emphasize the importance of the liver in the shock syndrome.

Reports from the literature are cited to show that in hemorrhagic hypotension and shock, the portal blood flow through the liver is profoundly depressed and this depression may be out of proportion to the

changes in the peripheral blood pressure. In one reported experiment, when the blood pressure was reduced to 30 mm. following hemorrhage, 11 of 12 dogs survived after viviperfusion of the liver via the splenic vein, while 15 of 17 dogs treated the same way, except that blood entered the jugular vein instead of the splenic vein, died after transfusion.

The authors found that the most potent stimulus for the formation of vacuolated cells in the liver was hemorrhage resulting in shock. However, similar vacuolated cells are found in other organs in acute anoxia and shock; the endocrines, striated muscles, heart muscle, and brain may be similarly affected. Thus disturbances in functions of many parts of the body are all involved in the shock syndrome.

F. J. LESEMANN, JR., M.D.

The Differential Diagnosis of Jaundice. S. ALLEN WILKINSON. *Surg. Clin. N. America*, 1948, 28: 575.

In a particular case of jaundice, the differentiation as to the type will usually be obvious from the history alone. There will be rare occasions when it will be impossible to decide whether or not there are enough features of obstruction to make it a surgical problem. In such cases it is better to operate than to temporize, and usually a combined form of jaundice will be found.

The differentiation of hemolytic jaundice from the hepatogenous type is not difficult. The finding of a known toxic agent, the presence of an increased amount of bile and urobilinogen in the stools, and of an increased amount of urobilinogen in the urine, plus the absence of bile in the urine and normal liver function tests, will usually make the diagnosis of hemolytic jaundice evident.

It is well known that there is no liver function test or group of tests that completely delineates the function of a liver.

The serum bilirubin determination is probably the most useful liver function test. The "one minute bilirubin" is said to measure the sodium bilirubinate present (the direct reaction), while the total bilirubin is an index of the sodium bilirubinate plus the bilirubinglobin in the blood. Thus, the one minute bilirubin will be low or absent in hemolytic or retention jaundice because most of the bilirubin present is in the form of bilirubinglobin. In severe hepatocellular jaundice or in obstructive jaundice the direct or one minute reading will be high, as it will show most of the total bilirubin present.

The urobilinogen determinations are important, helpful in differentiation, and not difficult. Urobilinogen is formed almost exclusively in the intestine from bile reaching the intestine by way of the common bile duct. This intestinal urobilinogen is partly reabsorbed by the portal circulation, returned to the liver, and used by the latter in protein synthesis. If the liver is damaged, much of the urobilinogen is passed on to the kidney where it is excreted. Hence, an increase in fecal urobilinogen occurs in hemolytic jaundice, and an increase in urine urobilinogen occurs in most cases of liver damage and particularly in portal cirrhosis. No urobilinogen will be found in the feces or urine if obstructive jaundice is present.

TABLE I.—TESTS FOR JAUNDICE

Test	Retention Jaundice		Regurgitation Jaundice	Normal Values
	Hemolytic Jaundice	Hepatocellular Jaundice	Obstructive Jaundice	
Bilirubin	1 min.-(0.2) low Total-high 2 to 5 mgm. %	1 min.-(1) high Total-very high (over 15 mg. %	1 min.-High Total-high 7 to 10 mgm. %	1 min. 0 to 0.2 mgm. Total-0.1 to 0.5 mgm.
Urobilinogen Feces	High	Normal or low	Absent	2 to 4 gm. per day
Urine	Slightly elevated	High	Absent	1 to 30 or less
Serum protein. Albumin-globulin ratio.	Normal or low Normal	High Reversed	Normal Normal	6 to 7 gm. % 3 to 4 gm. % 1 to 3 gm. %
Bromsulfalein, 5 mgm. per kilogram dose.	Normal	Dye retention	Dye retention	0% in 45 min.
Cephalin flocculation.	Normal	Positive	Normal (Any of these can become abnormal after liver damage occurs)	0 to plus (+)
Thymol turbidity	Normal	Positive		0 to 3 units
Thymol flocculation	Normal	Positive		0 to plus (+)
Cholesterol	Normal	Normal or low	Elevated	150 to 220 mgm. %
Cholesterol ester	Normal	Low	Normal	60% of total

The tests based on serum colloids and electrolytes are not yet well understood. There has been a great deal written about the application and comparative value of the Takata-Ara test, the cephalin-cholesterol flocculation test, the thymol turbidity test, the thymol flocculation test, and the colloidal gold test. No one as yet has satisfactorily explained just what it is that these tests measure. On the other hand, everyone is agreed that they are very valuable tests, and that they are among the most delicate and most reliable tests of liver dysfunction; however, no one of these tests covers all the various types of liver dysfunction. For this reason it is customary to order more than one, on the basis that if they are all normal, the chances are very good that the liver function is normal. These tests offer a valuable check on the progress of liver disease, and when they show a final return to normal we have the best evidence that the pathologic process has finally subsided. They do not offer any differentiation between intrahepatic and obstructive jaundice, but they are likely to be normal in hemolytic jaundice. In early obstructive jaundice they will also show normal findings, but these will change quickly as damage to the liver occurs consequent to back pressure in the biliary tree.

The serum cholesterol value combined with a cholesterol ester determination is sometimes of definite value. In obstructive jaundice, the total cholesterol is increased. In hepatocellular jaundice, first the esters and later the total cholesterol may be much decreased. In fatal cases they will fall almost to zero. EARL O. LATIMER, M.D.

Studies on the Pressures within the Common Bile Duct. Postoperative Cholangiomanometria. (Estudios sobre la presión intracoledociana. Colangiomanometría pos-operatoria). REMO S. FERRACANI. *Cirugia*, 1947, 1: 37.

The author, who has been working on pressures in the bile passages under the direction of Adrián J. Bengolea since 1938, uses a water manometer connected up with a Kehr tube or a Petzer sound. This in turn is attached to an apparatus making permanent graphs on a chart graduated in centimeters. The normal figures for pressure oscillate between 0 and 6 to 8 cm. of water, the values undergoing transient physiologic variations.

Under pathologic conditions, such as residual lithiasis in the common bile duct, pancreatitis, or even a spasm of the sphincter of Oddi, the biliary pressure tends to remain elevated for prolonged periods and may be accompanied by symptoms of biliary colic. The spasmodic or other occlusive condition may also be demonstrated by injecting colored fluids and observing the delay in their elimination into the duodenum by means of aspiration through the duodenal tube. The hypertensive condition tends to be relieved by injections of atropin or the administration of amyl nitrite, and induced or intensified by the administration of morphine, eserine, or pilocarpin.

The author concludes that the measuring of the intrabiliary pressures constitutes a valuable method for the study of the function of the terminal portion of the choledochus, especially when accompanied by pressure perfusion and by concurrent cholangiographic studies. JOHN W. BRENNAN, M.D.

The Effect of the Ligation of the Pancreatic Ducts and of Pancreatectomy After Duct Ligation on Serum Lipase. MARTIN M. NOTHMAN, T. DENNIE PRATT, and JOSEPH BENOTTI. *J. Lab. Clin. M.*, 1948, 33: 833.

In an effort to establish experimental proof of the clinical value of the serum lipase test, the authors have repeated part of the work of Cherry and Crandell and have contrasted these results with the conflicting reports of Popper and Sorter.

An attempt is made to answer the questions: (1) Is there an increase in serum lipase after pancreatic duct ligation? (2) If there is an increase in serum lipase, is it pancreatic or extrapancreatic in origin? (3) What is the mechanism of the increase of the serum lipase found in duct ligation?

The normal serum lipase values (olive oil-emulsion titration method) were established for 26 dogs. The average was found to be 0.6 units; after ligation of all pancreatic ducts, the 24 hour average was 5.1 units (a value 13 times normal); the 48 hour average was found to be 7.0 units, and after 6 to 7 days there was a tendency for values to decrease. This seems to answer the first question, and to prove that after ligation of the pancreatic ducts there is almost invariably a rapid rise of the serum lipase which lasts a relatively long time. Moreover complete pancreatectomy in 3 dogs resulted in an immediate decrease in lipase, and eventual death. These data substantiate the idea that lipase originates in the pancreas.

The evidence for the extrapancreatic source of the lipase enzyme was the recurrence of normal serum lipase values in 2 to 3 weeks after total pancreatectomy in 2 dogs in which preliminary ligation of the pancreatic ducts had been done.

As to the mechanism of the increase, a pancreatic fistula was formed of a portion of the pancreas, the ducts of which had all been ligated; the previously elevated serum lipase values associated with ligating the ducts dropped to normal when the pancreatic secretion was liberated.

The authors conclude that the mechanism of elevated lipase levels in the blocking of the ducts (ligating) is due to absorption of the enzyme into the blood after ligation.

JANE C. MACMILLAN, M.D.

Carcinoma of the Pancreas: Diagnostic Criteria. GRAYSON F. DASHIELL and WALTER LINCOLN PALMER. *Arch. Int., M.*, 1948, 81: 173.

The preoperative diagnosis of carcinoma of the pancreas is still a difficult one, and the authors attempt to bring out diagnostic criteria that will aid in an earlier recognition of the disease.

The group here reported comprised 90 patients. The average age was 55.9 years and the sex ratio was 2 men to 1 woman. The chief complaint was pain, followed in frequency by jaundice, loss of weight, anorexia, constipation, nausea, and vomiting. The average duration of symptoms was 4.7 months.

The pain was gradual in onset, and varied in location and quality, but was usually steady. In many cases the pain was more severe when the patient was in the supine position. The most frequent sites of pain were the epigastrium, the upper abdominal quadrants, and the back. Jaundice was present in 66.6 per cent of the patients. As a rule the jaundice was pronounced and progressive, although in one case the jaundice did subside. Considerable loss of weight occurred in all cases. Twenty-four patients suffered nausea and vomiting, and diarrhea was present in 18 patients. Steatorrhea was uncommon. The gall bladder was palpable in 52 per cent of the jaundiced patients. Glycosuria, usually inconstant, occurred in 27 per cent of the cases, and a diabetic type of dextrose curve was found in 18 of 21 patients tested. The diagnostic value of this procedure may be greater than has been realized.

Roentgenologic examination may enhance the chance of a correct diagnosis. In this series evidence suggestive of the lesion was present in 35 of 72 pa-

tients examined. The signs most commonly found were irregularities in the duodenal contour, distortion and displacement of the stomach, deformities of the duodenal bulb, and expansion of the duodenal loop. Lesions of the body and tail are less likely to produce roentgenographic signs than those of the head.

The authors comment on the importance of evaluating these signs and symptoms, and repeat the old injunction to "keep the disease in mind."

ELY ELLIOTT LAZARUS, M.D.

Surgical Conditions of the Spleen. FRANK H. LAHEY. *Surg. Clin. N. America*, 1948, 28: 559.

After briefly considering what is known of the physiology of the spleen the author classifies the splenic states in which splenectomy is indicated and splenic states in which the indications are not always clear.

The splenic states in which splenectomy is indicated are as follows: rupture of the spleen, ptosis and torsion of the spleen, cysts of the spleen, tumors of the spleen, abscess of the spleen, malarial spleen, and when splenectomy is included in total gastrectomy.

The splenic states in which the indications for splenectomy are not always clear are as follows: familial hemolytic jaundice (hereditary), idiopathic thrombocytopenic purpura, splenic neutropenia, primary splenic panhematocytopenia, Banti's disease (with limitations), Gaucher's disease (selected cases), and Hodgkin's disease (selected cases).

Since the spleen rests directly over the upper surface of the kidney, one should never fail, should operation be undertaken for a ruptured spleen, to investigate the kidney, since any force capable of tearing off or rupturing the blood supply of the spleen must in its course also be delivered to the region of the left kidney and may also rupture this organ. Wide incision (the author uses a long left rectus incision) and good anesthesia, particularly the added relaxation obtained with curare, make it possible to control the hemorrhage, and visualize the front surface of the kidney and the adrenal gland following removal of the spleen. Left nephrectomy may be done through the incision if necessary.

Ptosis and torsion of the spleen, cysts, abscesses, and malarial spleen are uncommon lesions. Tumors, exclusive of lymphomas, are rare; lymphosarcoma and Hodgkin's disease are the more frequently encountered tumors.

The author includes splenectomy in a great many, if not the majority, of the transthoracic resections for malignancy of the lower end of the esophagus or the upper end of the stomach. Also, splenectomy is usually combined with total gastrectomies. The best way to add omentumectomy and total gastrectomy is to leave the spleen attached to the omentum, to ligate the splenic vessels, to leave the vasa brevia running from the spleen to the stomach unsevered, thus there is complete removal of all of the greater omentum and, with the stomach turned up, it is possible to include also all of the gastrohepatic omentum with ligation of the gastric artery close to its origin. A review of the cases in which splenectomy has been included in these procedures has shown no bad effect on the blood picture.

Among the conditions in which the indications for splenectomy are not always clear, congenital hemolytic jaundice stands out as the disease in which splenectomy is most consistently satisfactory. If the operation is not undertaken during an acute episode and if the gall bladder which contains stones is also removed, recovery from the anemia and relief from the jaundice occur usually without other treatment.

Idiopathic thrombocytopenic purpura is rarely associated with significant enlargement of the spleen and the spleen may actually be of less than normal size. So excellent and consistent are the results following splenectomy in this condition that when they are not good the correctness of the diagnosis is questionable. Once the diagnosis is established, splenectomy should not be delayed.

Primary splenic neutropenia and primary panhematocytopenia respond satisfactorily to splenectomy. In those cases of panhematocytopenia in which the condition is secondary to other lesions the improvement will be definite but temporary.

While splenectomy in Banti's disease is not consistently followed by satisfactory results, splenectomy is indicated if the diagnosis can be made early, because of its propensity at least to decrease the load on the portal circulation and the possibility that it will defer or prevent the hemorrhages associated with esophageal varices, and delay the development of portal cirrhosis.

The author has had one case of Gaucher's disease in which splenectomy was performed. The results have been quite good temporarily.

EARL O. LATIMER, M.D.

GYNECOLOGY

UTERUS

Uterine Cancer: Its Early Detection by Simple Screening Methods. DANIEL J. MCSWEENEY and DONALD G. MCKAY. *N. England J. M.*, 1948, 238: 867.

For one year the authors have conducted a clinic for the early detection of cancer of the uterus at the Boston City Hospital. This "screening" process consists of a careful gynecological history, with special attention to abnormal bleeding and vaginal discharges, a pelvic examination, a speculum examination, and a vaginal smear. The last is most valuable as a test to determine cases that may require diagnostic curettage or cervical biopsy. Cases that are positive on smear, or suspicious on smear, history, or pelvic examination, are subjected to biopsy by curettage, cervical biopsy, or both.

The technique and a brief description of the cellular characteristics are given.

The authors believe this method of screening is simple and efficient and definitely aids in the diagnosis of carcinoma. The degree of accuracy, of course, depends on the care with which the smears are taken, and the training and experience of the cytologist.

Of 54 cases of cancer, 51 were diagnosed correctly by smear.

Six cases of carcinoma, which might otherwise have been neglected, were detected by the vaginal smear technique, and 6 others were detected simultaneously by biopsy and smear. T. FLOYD BELL, M.D.

Sarcoma of the Uterus. THOMAS PERRY, JR. *N. England J. M.*, 1948, 238: 793.

The author reports 4 cases of sarcoma of the uterus in detail. These are part of a group of 18 cases seen during the past 18 years at the Rhode Island State Hospital, Providence.

In a review of the subject of uterine sarcomas, it is pointed out that sarcomas may arise both in the smooth muscle of the uterus and in the stromal cells of the mucosa. The author also emphasizes that all reports show a preponderance of leiomyosarcomas over other forms of uterine sarcoma. The stromal or mucosal cell cancers of the endometrium are characterized by round cells rather than by spindle cells as found in typical leiomyosarcoma. The author also includes in this group the various types of mixed tumors which, despite their pleomorphism, presumably arise from stromal cells or their anlage. There are in this group mixed mesodermal tumors which contain more than one type of tissue of mesodermal origin. There are those which contain tissue of mesodermal origin and epithelium and are referred to as carcinosarcomas. A large proportion of stromal cell tumors, if carefully examined, show a mixed histology. All these sarcomas tend to contain giant cells.

Hemangiosarcoma and botryoid sarcoma are rare types. The botryoid type is most frequently seen in the cervical portio of infants, and presents a mixed histological pattern which includes epithelium, myxomatous tissue, striated muscle, and other elements.

Most patients with uterine sarcoma have advanced disease after the onset of symptoms, and radiation therapy invariably is useless. The author found that in the study of his group of patients, there was a direct relationship between the number of mitotic figures and the rapidity of growth. It was found that in the larger tumors the areas which were more anaplastic were larger. Total abdominal hysterectomy with bilateral salpingo-oophorectomy is the treatment of choice. The chief cause of the low survival rate is the silent nature of many of the tumors. None of these tumors seem to arise in the cervix. The author thinks that most of them are malignant from inception and rarely arise in myomas.

The botryoid type usually arise in the portio of the cervix and extend down into the vagina. Striated muscle fibers in this tumor are considered pathognomonic.

It was advanced by Wilms, in 1899, that the mixed sarcomas of the uterus originate in displaced myotome and sclerotome elements which are carried down by the wolffian ducts.

HENRY C. FALK, M.D.

Additional Data in the Technique of Vaginal Hysterectomy. N. SPROAT HEANEY. *West. J. Surg.*, 1948, 56: 377.

After briefly relating the history of vaginal hysterectomy, the author presents his method of procedure.

Since the operation may be difficult with the ordinary instruments used in abdominal work, a list of more suitable armamentarium is given. Two assistants are required. The operation is described in detail.

Shock occurs only rarely, and usually the loss of blood is small. The intravenous administration of saline, and blood transfusions are not given routinely. Patients are urged to sit on the edge of the bed with the feet in a chair the day after the operation, and to sit out of bed the following day; they are allowed to go to the toilet with help, and are dismissed from the hospital one week after operation.

T. FLOYD BELL, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

The Characteristics in Hysterosalpingograms in Tuberculous Salpingitis and Endometritis. KO-CHI SUN. *Am. J. Obst.*, 1948, 55: 953.

Unique and fairly constant topographic characteristics are seen in the hysterosalpingograms in tuberculous salpingitis and endometritis. The salient features are summarized:

1. In the plain films made before the injection of contrast medium in 4 of 6 patients, opaque bodies

were seen in the pelves. In 2 cases fibrocalcareous adhesions were visible.

2. The filling of the uterine organ and the tubes was rather tardy. In the filling, no sign of contractions was apparent. When filled, the cervical canal exhibited a fuzzy shadow which has been described as "manelike" or "feathered" by various workers. The uterus appeared like a trumpet or a Voorhees' balloon, and its borders were shaggy and jagged. Its fundic shadow was invariably convex, and its lateral contour, likewise, bulging. The tubes, if filled, were filled in a jerky, fragmentary fashion so that their entire contour appeared to be beaded, segmented, and "fractured." They were stiff, wiry, thready, and drooped downward like a filament. There was often an abrupt ending of the filling process. The fimbria were pouchlike, saccular, and diverticular in shape.

3. The appearance of the entire contrast medium was uneven, nonhomogenous, and simulating foreign bodies.

4. The stationary manner or the lack of spread of the contrast medium in the free peritoneal cavity, and the frequent complete emptying of the filled tubes after 24 hours were quite characteristic.

5. The imperfect filling of the organs might mislead one to think of a hypoplastic or a malformed uterus.

The pathogenesis of these characteristics is discussed, and an outline of the differential diagnosis by means of hysterosalpingograms in various diseases is presented.

The presentation does not mean that all cases of tuberculous salpingitis and endometritis would present all the characteristics in the hysterosalpingograms. Never should one entertain the idea that tuberculous salpingitis and endometritis can be diagnosed by means of roentgenograms alone.

JOHN R. WOLFF, M.D.

Ovarian Fibroma with Ascites and Hydrothorax. NIC. CLEMETSEN. *Acta obst. gyn. scand.*, 1948, 28: 96.

Meigs' syndrome has been noted in patients with other ovarian growths than fibroma. Its occurrence is infrequent, and the majority of some 50 published cases are to be found in the American literature. Only about half of these tumors are complicated by ascites.

The ovarian fibromas which form parts of Meigs' syndrome vary in size from orange-sized to larger than a man's head. They are mostly unilateral. In shape they are round or oval. The surface is often crinkled, white, or whitish-yellow in color, in most cases smooth and mirrorlike. They are hard, often with larger or smaller cavities.

Microscopically they are seen to consist of fibrous connective tissue with many collagen fibrils. The cavities are usually without epithelium.

The ascitic and pleural fluid, which is usually found in large quantities, is as a whole slightly turbid, or of a yellow to reddish color, and contains varying numbers of mononuclear and red blood cells.

Most of the patients with Meigs' syndrome whose cases have been reported, were from 40 to 50 years of age.

The most frequent symptoms are those referable to the chest, such as shortness of breath, stitch in the side, and cough. Next in frequency among the symptoms is enlargement of the abdomen.

Treatment consists in laparatomy and extirpation of the tumor.

As to the cause of ascites, the theory now generally accepted is that the greatest part of the ascites is formed in the tumor itself on account of circulatory disturbances. The production of ascites is too great in proportion to the capacity of the draining apparatus.

With the support of Efskind's experimental investigations respecting absorption in the peritoneum of rabbits, and on the assumption of similar conditions in man, the author submits the hypothesis that the lymphogenous drainage of the ascites takes place preferentially through the right part of the diaphragm via subpleural lymph vessels to the anterior intercostal lymph glands and therefrom further over into the blood-vascular system.

If outflow from the anterior intercostal lymph glands is impeded, lymphostasis will arise, and result in hydrothorax, especially on the right side.

One case is presented. T. FLOYD BELL, M.D.

Six Cases of Primary Carcinoma of the Fallopian Tubes. LUDWIG A. EMGE. *West. J. Surg.*, 1948, 56: 334.

The author presents 6 cases of primary carcinoma of the fallopian tubes. There was a 0.3 per cent incidence of tubal carcinoma among 2,000 tubes removed from 2,000 patients.

It is observed that primary tubal cancer is not only insidious and vicious in its growth habits but most confusing in its symptomatic manifestations. Large and localized malignancies often remain asymptomatic. Commonly they are confused with ovarian malignancy. Some authors state that the diagnosis should be thought of when pelvic inflammatory disease occurs at an age when tubal infection is rare but malignancy common, and there is a sudden appearance of profuse uterine discharge not explainable by cervical or uterine disease. The manifestation of repeated discharge, as seen in hydrops tubae profluens, is not a common finding.

The author believes that the vaginal technique of examining vaginal discharge is more apt to facilitate recognition of all pelvic cancers. Hysterosalpingography is not safe.

All 6 patients observed were dead in 20 months. The gross and microscopic appearance of the malignant tubes removed conformed to that described by other observers with regard to types and cellular compositions.

Primary cancer of the fallopian tubes remains grossly localized for a considerable length of time, provided the fimbria closes before the disease spills into the pelvis. The well known resiliency of the tu-

bal wall permits enormous extension before the muscular layers are invaded. Lymphatic extension probably occurs long before extension of the growth affects the tubal wall. The grading of tubal cancer is not wise because all grades may be found in the same tube. The grade of cellular differentiation in no way allows for prognostication. The treatment is surgical and as radical as possible.

HENRY C. FALK, M.D.

Normal and Cystic Structures of the Broad Ligament. GEORGE H. GARDNER, R. R. GREENE, AND B. M. PECKHAM. *Am. J. Obst.*, 1948, 55: 917.

The literature on cysts of the broad ligament was reviewed in an attempt to find or to formulate an accurate classification of these structures. Because of the terminologic welter, histologic mélange, and embryologic diversities encountered, it was decided to study the embryonic development of broad ligament structures, the normal adult broad ligament, both in routine and in serial section, and, finally, the abnormal broad ligament. That portion of the study having to do with the histogenesis of cysts of the broad ligament is presented. The embryology and the normal and abnormal structures of the adult broad ligament are given. A simple classification based on histogenesis is proposed.

The authors believe that much of the existing confusion in classifying normal and cystic structures of the broad ligament can be eliminated by discarding terms based on proper names and using those having histogenic significance.

Certain well developed structures derived from the embryonic mesonephros are present in the adult broad ligament, and can be demonstrated in properly fixed, sectioned, and properly prepared tissues.

Mesonephric ducts, mesonephric tubules, and paramesonephric structures, as well as their respective cystic derivatives, have an individual and a characteristic histologic appearance; each can be identified with ease.

It is possible to classify most cysts of the broad ligament on the basis of the character of their lining epithelium, but it is impossible to classify them accurately on the basis of their location in the ligament.

JOHN R. WOLFF, M.D.

MISCELLANEOUS

The Use of the Vaginal Smear in a Gynecologic Service. LOCKE L. MACKENZIE, BEN B. WETCHLER, JOHN C. DUBOIS, AND THEODORE NEUSTAEDTER. *Am. J. Obst.*, 1948, 55: 821.

At the New York Post-Graduate Medical School and Hospital, New York, New York, the vaginal smear has become a distinct addition to the diagnostic resources. It is not suggested that it supplants the well established diagnostic methods such as physical examination, biopsy, and biologic hormonal assays and tests, but vaginal smears are used in association with the others, and a proper amount of credence is placed on the interpretation.

The technique is particularly useful in evaluating endocrine disorders in women. The diagnosis of malignancy of the female genitalia can be made in a high percentage of cases, and the method should be more widely used for this purpose.

All efforts should be directed toward an attempt to establish a smear criterion of premalignant change.

JOHN R. WOLFF, M.D.

Implantation of the Ureters into the Rectosigmoid in Case of Urethrovesicovaginal Fistula (L'impianto degli ureteri nel sigma-retto nelle fistole uretro-vescico-vaginali). ANGELO DE PALO. *Quad. clin. ostet. gin.*, 1947, 2: 883.

The following indications for ureterosigmoidal anastomosis are listed by the author in order of their importance and frequency: urethrovesicovaginal fistula, vesicovaginal fistula with extensive destruction of tissues, grave trauma of the urinary bladder, vesical exstrophy, difficulties encountered in ureterocystoneostomy following an injury of the ureters during obstetrical or gynecologic operations. The last mentioned injury of the ureters occurs relatively frequently in the course of a total hysterectomy for cancer of the uterus or for an intraligamentary fibroma. Such an injury may also complicate removal of the adnexa, which following inflammatory processes form adhesions to the pelvic peritoneum.

In the case reported by the author, a vesicovaginal fistula appeared in a woman aged 24, on the fourth day of the puerperium following a spontaneous, normal delivery at term.

The physical examination disclosed an extensive vesicovaginal fistula involving the trigonum, with nearly complete destruction of the urethra. An attempt to repair the urethra through the vaginal route, 9 months after the delivery, failed. Thirteen months later the physical examination showed a nearly complete destruction of the anterior vaginal wall without traces of the urethra.

The ureters were implanted into the rectosigmoid area according to a slightly modified Hinman's technique under spinal anesthesia. The operation was performed in 2 stages, 5 weeks apart, one ureter being implanted each time.

The immediate and late results, checked with descending pyelography, were excellent.

JOSEPH K. NARAT, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Hemoconcentration in Obstetrics (La hemoconcentración en obstetricia). Luis Tisne Brousse y Orlando Trivelli Rocchi. *Bol. Soc. chilena obst. gin.*, 1947, 12: 302.

The author found from his experience in 450 examinations with the Wintrobe hematocrit in pregnancy and the puerpeurium that the blood concentration was about 40, which suggested that there is a condition of hydremia during the gravid state which, varying with the individual, is greater than that commonly encountered in nonpregnant women. However, numerous factors have an influence on this condition of hydremia and the test is found to represent another aid in the clinical examination of the patient and a guide to diagnosis and therapy.

Perhaps the most important condition to be looked for is the blood concentration leading to shock which may be present preceding the operation or during dystocia in patients who have been subjected to a low fluid, salt-free diet, such as is commonly prescribed for the edematous renal or cardiac conditions encountered during the period of pregnancy.

The preoperative determination of the erythrocyte volume is also very important, since the blood concentration may already be high (preshock condition) because of prolonged labor or a low fluid diet, and the extra load placed on the organism by the operation may produce an irreversible condition. In such a contingency the patient must be given fluids, even during the postoperative period, because the natural tendency toward a restricted regimen can easily eventuate in an unnoticed concentration which may lead to shock. John W. Brennan, M.D.

Pernicious Anemia of Pregnancy and the Puerperium. L. S. P. Davidson, R. H. Girdwood, and J. R. Clark. *Brit. M. J.*, 1948, 1: 819.

The authors state that Addisonian pernicious anemia is uncommon, but that pernicious anemia of pregnancy is rarer still. Of 521 cases of macrocytic anemia examined in the last 7 years, only 31 were associated with pregnancy, and of these only 4 were seen since the introduction of folic acid. No reports have appeared in the British literature and only 4 cases have appeared in the American literature on the therapeutic value of folic acid in this type of megaloblastic anemia (3 by Spies in 1946 and 1 by Moore *et al.* in 1945). Folic acid was given in all cases by the parenteral route and in all cases a satisfactory response was obtained.

In the present article the authors report 3 cases of pernicious anemia of pregnancy and 1 case of Addisonian pernicious anemia that relapsed as a result of pregnancy, all of which responded to folic acid.

The works of Stevenson (1938), Callender (1944), and Davidson, Davis and Innes (1942) are cited. Davidson and Davis (1947) noted four points of particular importance in the diagnosis of pernicious anemia in pregnancy.

1. The demonstration of typical megaloblasts in the bone marrow since the peripheral blood picture may differ from that of Addisonian pernicious anemia, the color index may be below one, and the M.C.V. within normal limits.

2. Although free hydrochloric acid is often present in the gastric juice in a number of cases, a histamine-fast achlorhydria is found. Unless the effect of stopping liver therapy is observed for a period up to 2 years, it is difficult to decide whether it is a case of pernicious anemia of pregnancy or Addisonian pernicious anemia complicated by pregnancy.

3. The response to parenteral liver therapy may be normal, poor and delayed, or absent.

4. Cases refractory to parenteral liver therapy will respond to oral treatment with proteolysed liver or to cooked liver (Fullerton, 1943).

No adequate explanation for the development of pernicious anemia of pregnancy has been forthcoming. Possibly it is a failure of some intake factor, from a failure of production of Castle's intrinsic factor, or defective absorption from the alimentary tract.

The authors suggest folic acid as the treatment of choice because it can be administered by mouth and shows rapid hematological improvement. Since the treatment is limited to a few weeks, the danger of producing subacute combined degeneration of the cord is greatly reduced as compared with Addisonian pernicious anemia. However, they state further that time must elapse before it can be stated confidently that neurological features will not occur in patients with pernicious anemia receiving folic acid.

The authors also warn that many cases of pernicious anemia of pregnancy also suffer iron deficiency, and this must be corrected accordingly.

Byford F. Heskett, M.D.

Leucemia and Pregnancy. John A. Williams. *Am. J. Obst.*, 1948, 55: 967.

The coexistence of leucemia and pregnancy is rare. A review of the literature together with 2 cases added in this report brings the total number of reported cases of pregnancy associated with leucemia to 90.

A case of chronic myelogenous leucemia complicated by pregnancy, with the mother still living more than a year after delivery, is presented.

A fatal case of acute monocytic leucemia complicating pregnancy, with a discussion of autopsy findings, is presented. No similar case has been found in the literature.

With critical review of the literature, it is safe to conclude that pregnancy has little, if any, effect on the course of leucemia. Leucemia per se does not require any special obstetric management.

Premature labor has been seen in the majority of cases, but severe hemorrhage, postpartum or during delivery by any method, has been uncommon—9 instances among 88 patients, with 3 deaths.

JOHN R. WOLFF, M.D.

The Possible Significance of Arterial Visualization in the Diagnosis of Placent Previa. LEO J. HARTNETT. *Am. J. Obst.*, 1948, 55: 940.

Arteriography is a method by which the outline of arteries may be seen on x-ray plates following the injection of radiopaque substance. This procedure has been carried out on almost every organ and region of the body. It was conceived that by delaying the time of exposure following the injection of opaque solution into the aorta, the maternal circulation over the placental site might be visualized by roentgenography. This procedure was carried out on 68 women in the later stages of pregnancy. The technique is given in detail.

All women in this series delivered without mishap, and all babies were living and apparently unaffected. Mothers and infants were released from the hospital after the usual routine lying-in period.

Two cases of bleeding were encountered, one at the thirty-first week of pregnancy and the other at the twenty-eighth week. Aortograms were performed on these patients with no ill effects. In both instances there was a question as to the cause of bleeding.

If the bleeding had been produced by the separation of a low-lying placenta, the attendant danger to the mother and baby would have been less than had it been produced by an abruptio placentae. Since the hemorrhage, in both instances, was profuse and sudden in onset, gradually subsiding, the aortograms proved very useful when making a decision as to treatment.

In considering whether the risks involved in aortography are worth while in comparison with the hazards of watchful expectancy, the author believes that the series is not large enough for him to come to a definite conclusion. It appears evident that the procedure is sound and that the failures have been the result of errors in technique rather than a lack of fundamental soundness. JOHN R. WOLFF, M.D.

Chorea Gravidarum: Review of the Recent Literature and Report of 5 Cases. THOMAS W. MCELIN, SIM B. LOVELADY, and HENRY W. WOLTMAN. *Am. J. Obst.*, 1948, 55: 992.

Chorea gravidarum is an infrequent complication of pregnancy. However, though rarely observed it occasionally presents a grave problem.

Data from 13 American hospitals suggested a hospital incidence of 1 case per 3,501 obstetric admissions although this may be an exaggerated concept of the frequency of this complication, since of 170 obstetricians replying to their questionnaire, 113 had never observed a case.

The average age of the patients was 22.4 years. Chorea associated with pregnancy was observed much more frequently in primigravid patients. An illegitimacy rate of 17.2 per cent was observed. The authors commented on the rarity of this factor in the Negro race.

The well known syndrome consists chiefly of hypermotility and incoordination which is usually generalized. The movements usually cease during sleep. The patients are usually afebrile and when fever does occur it is of ominous significance. Hyperpyrexia can occur.

The most frequent complications were stated to be acute psychosis, acute endocarditis, and rheumatic fever.

Authors whose articles were reviewed warned against the excessive use of depressant drugs. The prophylaxis of chorea gravidarum consists of proper prenatal care. The treatment consists of keeping the patient at rest in bed and the administration of sedatives. Emptying of the uterus should be considered if the patient's condition becomes progressively worse. Local anesthesia should be used whenever possible and a neurologist should always be consulted.

The authors found it impossible to draw any significant conclusions from the small series of 5 cases observed at the Mayo Clinic, which they presented. In all of these cases chorea began in the first half of pregnancy and lasted for periods varying from 2½ weeks to 5 months. All of the pregnancies were terminated spontaneously at term and 6 normal babies were born (1 twin pregnancy).

Only 1 patient, whose condition might have been described as moderately severe, required hospitalization while under their care.

No evidence to support a toxemic etiology of this condition was present in this series, other than perhaps the nausea and vomiting mentioned in 2 cases. A rheumatic background was present in all of the cases. A past history of chorea was given in 3 cases and of rheumatic fever in 2 cases. Heart disease was present in 3 cases.

The recent literature concerning chorea gravidarum is considered. Reference is made to the toxemic, allergic, rheumatic, infectious, and psychogenic hypotheses of origin of chorea gravidarum. The current status of authoritative obstetric opinion is reviewed. The case for a rheumatic etiology of this condition is further strengthened by the 5 case reports. A suggestion of psychogenic "color" was present in this series. Conservative methods of treatment and delivery were used in all cases. A successful outcome of the pregnancy occurred in all instances.

LABOR AND ITS COMPLICATIONS

The Duration of Labor: Mean, Median, and Mode. TRENT BUSBY. *Am. J. Obst.*, 1948, 55: 846.

The figures cited in textbooks for the duration of labor are 18 hours in primigravidas and 12 hours in multiparas. These are mean or average values calculated simply by adding up the total hours occupied by all labors in a large series, and dividing by the number of labors. Although mean or average figures

are often valuable, they may sometimes be very misleading and not truly representative. The incidence of prolonged labors tends to distort the actual average figure.

The median and modal durations of labor are more statistically significant than the mean, or average, and certainly more in keeping with the experience of obstetricians. In white primiparas, the mean was found to be 13.04 hours, the median 10.59 hours, and the mode 7 hours. In white multiparas, the mean was 8.15 hours, the median 6.21 hours, and the mode 4 hours.

The average duration of labor is longer in negro than in white patients, because of the greater incidence of prolonged labor in the former. Recent improvements in obstetrical technique and prenatal care have significantly shortened the average duration of labor. JOHN R. WOLFF, M.D.

The Treatment of Placenta Previa (Consideraciones sobre tratamiento de la placenta previa). JORGE ROUBILLARD GONZALES. *Bol. Soc. chilena obst. gin.*, 1947, 12: 310.

In this dissertation (on the occasion of the author's enrollment as a member of the Chilean Obstetrical Society) the therapeutic implications gleaned from a statistical consideration of the results obtained in 402 cases of placenta previa in 41,698 births (0.96 per cent) at the Maternidad del Salvador in Santiago de Chile are discussed.

No decisive conclusions are drawn as to the benefits to be expected from the introduction of the sulfonamides and penicillin, since the period of their usage has been so short; however, a favorable effect has been noted, not so much in regard to morbidity as to the incidence of more serious infections which endanger the life of the mother. In fact, during recent years there has been only 1 death among the mothers with placenta previa and in this case the woman presented a hopeless condition of perfringens septicemia when received in the clinic.

The encouraging control of the infections fixes our attention on the hemorrhages. These cannot be prevented after the manner of the infections, nor can they be foretold with any certainty—other than that they will certainly occur—and the only prophylaxis at present seems to be the removal of the contents of the uterus, with resort to all of the modern resources for combating the anemia and other complications.

Cesarean section seems to be the only definitive recourse for placenta previa centralis totalis and this operation is indicated as soon as the diagnosis of this condition is made. Delay to await a more secure viability of the fetus is not to be considered, especially at present when modern progress in pediatrics offers greater chances for the immature infant, because it endangers both the mother and child.

For the other forms of placenta previa, cesarean section may on occasion be avoided; however, even in these cases the more radical procedure may be amply justified. So many factors intervene in these patients that it seems impossible to lay down definite rules for their treatment. The one invariable rule is that these patients should be in a hospital from the instant of the first bleeding until the child is delivered. Here the viability of the fetus may rate some consideration since the mortality rate among infants weighing less than 2,500 gm. is very high. Of 211 dead babies, 134 weighed less than this amount.

During the discussion, ROGELIO RODRÍGUEZ B. related the use of the forceps of Willett in some instances in which the bleeding had persisted after the rupture of the membranes in placenta previa centralis partialis.

HECTOR CABRERA does not agree with the author as to the technique of the cesarean section itself. The author reports the use of corporeal or segmentocorporeal type of incision in 20 per cent of cases. Cabrera, on the other hand, reports 313 operations done at the Maternidad of San Fco. de Borja with only 2 corporeal incisions, and the only death from peritonitis occurred in one of the 2 patients with this incision. The low incisions frequently passed right through the areas of implantation of the placenta without detriment to either mother or child.

MANUEL MORENO states that it is not the type of placenta previa which is important but the quantity of blood lost and the grade of anemia produced. In this respect the determination of the hemoconcentration is important. JOHN W. BRENNAN, M.D.

Spinal (Saddle Block) Anesthesia in Obstetrics. G. J. ANDROS, WILLIAM J. DIECKMANN, P. OUDA, H. D. PRIDDLE, AND OTHERS. *Am. J. Obst.*, 1948, 55: 806.

This is the study of 719 cases of modified saddle block anesthesia carried out at the Chicago Lying-In Hospital, Chicago, Illinois. The procedure has been found to be safe, simple, and precise. The degree of success has been high. The rate of operative interference in delivery was not significantly increased. Complications attributable to the anesthetic procedure have not been a problem. The benefits to the fetus in early spontaneous respiration have been striking. There has been no increase in the fetal or maternal morbidity or mortality.

JOHN R. WOLFF, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Acute Puerperal Mastitis. H. CLOSE HESSELTINE, CHARLES G. FREUNDLICH, AND K. EILEEN HITE. *Am. J. Obst.*, 1948, 55: 778.

Acute mastitis is a serious medical and psychological complication of the puerperium, especially if suppuration occurs. Early treatment of the condition may often bring about subsidence without suppuration. Many reports indicate that penicillin will aid recovery. Somewhat different results observed at the Chicago Lying-In Hospital, Chicago, Illinois, have stimulated the present report.

Two hundred and ten patients having suppurative puerperal mastitis were observed. Suppuration was

observed in 6 of 23 consecutive patients with mastitis who were receiving penicillin therapy. Eleven strains of staphylococci isolated from the suppuration grew in the presence of penicillin.

After nursing the local use of ointment containing penicillin failed to affect the incidence of mastitis.

Nasopharyngeal cultures from mothers and babies were examined for the staphylococcus aureus. Twenty-one of 30 babies were found to harbor this organism during the first 10 days of life, as did 20 of the 30 mothers. Ten of the strains were resistant to penicillin in vitro.

The present work indicates that infection of the breast may occur in lactating mothers from the patient herself, or from the nursing infant. The importance of the nasopharynx has been stressed. The resistance of the organism to penicillin therapy is certainly a factor in the development of suppuration.

JOHN R. WOLFF, M.D.

MISCELLANEOUS

Therapeutic Abortion: Medical Considerations. HORACE M. KORNS. *J. Am. M. Ass.*, 1948, 137: 333.

This article concerns itself with heart disease as a complication of pregnancy. Hypertension of the progressive type is considered to be a definite contraindication to pregnancy. However, in the types of hypertensive diseases in which there is no progressive increase in the signs and symptoms, interruption is not necessarily indicated. Valvular heart disease can be successfully managed in some cases, the decision as to which patients can tolerate pregnancy being based upon the age of the patient, the amount of cardiac hypertrophy, the past or present congestive heart failure, and the mechanism of the heart beat. Cardiac hypertrophy should be considered evidence of severe damage and of much greater significance than the valvular lesion itself. Congestive heart failure of a progressive nature is considered to be a clear-cut indication for the interruption of pregnancy. If there has been a history of congestive heart failure in the past, only with the most careful observation should the pregnancy be carried. Severe and intractable disturbances of the mechanism of the heart beat likewise may require therapeutic abortion, as does the onset of acute rheumatic heart disease or subacute bacterioendocarditis.

Following these two articles is a round table discussion at which a number of questions were answered by the discussants. In general it was agreed that with nearly every disease, individual attention should be given each patient and no over-all rule can be made to cover any disease. Both incest and rape were believed to be adequate causes for therapeutic abortion. The question of therapeutic abortion when the mother has had German measles early in pregnancy was raised. It was believed that there was insufficient evidence at this time to indicate interruption in all cases. Hyperthyroidism should be treated as if the patient were not pregnant. Recurrent toxemia of pregnancy, likewise, was not believed to be an indication for therapeutic abortion unless advanced cardiac or renal damage was present. In the presence of RH incompatibility with repeated loss of the fetus, the discussants favor complete blood studies in an effort to determine whether or not the husband was heterozygous or homozygous. The question should then be referred to one of the experts on blood groups for determination as to whether or not interruption of pregnancy is advisable in that individual case. The discussion was summarized and the importance of careful medical care was stressed over that of therapeutic abortion, not only because of the dangers of the latter but also because of the tremendous loss of fetal life.

JAMES F. DONNELLY, M.D.

Therapeutic Abortion: Surgical Considerations. SAMUEL C. HARVEY. *J. Am. M. Ass.*, 1948, 137: 331.

This article is a portion of a round table discussion on the indications and problems associated with therapeutic abortion. Emergency operations, such as those for acute appendicitis and intestinal obstruction, should be performed immediately even if there is some risk of causing abortion. Other surgical problems, however, such as hemorrhoids and varicose veins, can be postponed until the pregnancy is terminated normally. Under no condition in either group is therapeutic abortion justifiable. In cancer of the breast there is no evidence to indicate that continuation of pregnancy will alter the growth behavior of the malignancy. Therefore, the patient should be treated as if she were not pregnant and the pregnancy not disturbed. However, it would seem wise to advise the patient not to undertake further pregnancies for at least 4 or 5 years, and preferably not at all, and not to attempt to nurse her infant with the remaining breast.

JAMES F. DONNELLY, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Renal Infarction. FRANCIS C. REGAN and E. GRANVILLE CRABTREE. *J. Urol.*, Balt., 1948, 59: 981.

The author's purpose is to indicate the types of infarction which may be encountered and the immediate and remote effects on the anatomy and physiology of the kidney, to collect the reported cases, to emphasize the essentials of clinical diagnosis both for acute and the terminal states of the disease, and to suggest methods of proper management.

The literature on renal infarction may be divided into two large groups: (1) reports based on clinical and autopsy findings, and (2) those based on the clinical findings plus urological examination. In the first group, an analysis of cases reported showed that the diagnosis was suspected from the sudden onset of pain in the kidney area in cardiac patients. In the majority, the pain was steady and radiated to the side. The urine in these cases contained albumin and the sediment showed red cells in half of the instances. In most of these cases, death occurred from anuria and cardiac failure. Group 2 represents reports of 70 cases comprising 47 arterial, 20 venous, and 3 traumatic infarctions. In the cases of arterial infarction pain began suddenly, was situated in the flank or upper abdomen, and persisted for 2 to 4 days. There was some disease of the heart or blood vessels in the majority of these cases. By intravenous pyelography in 10 cases, and by indigo carmine in 10, the function of the involved kidneys was shown to be very poor or absent in all of the 20 cases tested. Return of function in the affected kidney required various lengths of time, ranging from 1 to 4 months. In those instances in which retrograde pyelography was done, it showed normal configuration of the renal pelvis, calyces, and ureter. In 19 cases the urine contained albumin 1 to 4 plus and red blood cells and white blood cells varying in amount. The author presents a detailed analysis of 20 cases of renal infarction in which cystoscopic study was not made, 70 cases in which complete urological study was carried out, and 4 cases of his own, a total of 94 patients.

Of the 94 cases of infarction, 71 were instances of arterial infarction, most of which were sterile infarcts. In some the infarction was bilateral and extensive, and in others it was unilateral with varying degrees of extent. The fate of the patient depends upon the bilateral occurrence of the lesion and the integrity of the other kidney when but one kidney is involved.

The diagnosis of arterial infarction is based on the following points: (1) sudden onset of pain in the flank or upper abdomen; (2) the demonstration of a nonfunctioning kidney on the involved side by intravenous pyelography and by failure of excretion tests; (3) the finding by retrograde pyelography of normal pelvis, calyces, and ureter on the affected side; (4) the presence of disease of the heart or blood vessels; (5) the presence of albumin in abnormal amounts in the urine together with microscopic, and occasionally gross, hematuria.

Diagnosis of renal infarction may be made in kidneys which were the seat of previous infarctions. It has been shown that cystic degeneration of old infarcts occurs, and it is to be remembered that the characteristic end-result of infarction is calyceal shrinkage. These observations may aid in the differential diagnosis of such cases in which acute infarction is present.

It appears to be a fact that total, or near total, loss of function in the affected kidney is a primary diagnostic symptom in infarction. This occurs irrespective of the degree of involvement of renal tissue.

Venous infarction is a much more serious disease than aseptic arterial infarction. Clots are more often infected, and the condition is either bilateral or apt to become so by extension of the original process of thrombosis. The clinical picture of renal infarction due to venous thrombosis differs from that of arterial thrombosis in the following manner: (1) it is associated with septic states—pneumonia, enteritis, puerperal infection, pyelonephritis, pyemia—or it follows thrombophlebitis of the leg veins or vena cava; (2) the kidney is greatly enlarged and is often palpable; (3) there is gross hematuria in most cases, and occasionally perirenal hemorrhage; (4) retrograde pyelography usually shows deformity and incomplete filling of the pelvis and calyces; (5) the condition runs a progressive and septic course, and most patients do not recover unless nephrectomy is done.

Traumatic infarction is much more rare than arterial and venous infarction, only 3 cases being reported. One patient had pain in the flank and hematuria following an accident. The second showed absence of function by intravenous pyelography, but retrograde pyelogram showed normal calyces, pelvis, and ureter. The urine was clear except for large amounts of albumin. In the third case an autopsy was carried out.

In summary the author states that arterial, venous, and traumatic infarctions of the kidneys are diagnostic and surgical entities, each type manifesting certain characteristics from which a diagnosis may be made. Sterile arterial infarction is the most common. It seldom, if ever, requires surgery. Venous infarction is a serious condition. Its close association and origin with septic states, and the almost invariably infected clots, make surgery imperative when the condition is unilateral. Traumatic infarction depends directly on injury to the vessels.

The most important single indication for diagnosis of acute infarction of the kidney is complete, or almost complete, loss of function, almost irrespective of the degree of tissue involvement, in kidneys which

appear normal by pyelography. Detailed analysis of the collected and reported cases is presented.

ROBERT O. BEADLES, M.D.

Renal Tuberculosis. JAMES C. MCCLELLAND, KENNETH H. DAVIS, AND ERIC MASSIG. *J. Urol.*, Balt., 1948, 59: 795.

The authors have had an opportunity to supervise personally 400 cases of genitourinary tuberculosis. This article states briefly the clinical and pathological findings in the kidneys removed at operation together with those studied at autopsy. Nephrectomy was carried out in 57 of these patients whose symptoms varied, and the pyelographic changes varied from no change to marked cavitation of the parenchyma. Autopsy was done in 40 of these cases. The lesions varied from tiny ulceral cavernous lesions to complete autonephrectomy. Grouping together the surgical and autopsy specimens provided an opportunity to make gross and microscopic studies of 105 tuberculous kidneys.

In the review of the pathology the outstanding lesions seen were those of progressive tuberculous involvement and destruction of one or both kidneys. The lesions may be grouped into three main categories: (1) the early solitary or multiple caseous lesions, (2) intermediate ulcerocaseous lesions with single or multiple cavitation, and (3) the late tuberculous pyonephrosis. The entire series presented 2 autonephrectomies, 12 pyonephroses, 28 ulcerocaseous lesions with cavitation, 7 solitary or multiple caseous nodular lesions, 6 of the very early ulcerocaseous type of lesion without cavitation, and 2 cases of very early single caseous foci involving the tip of a single papilla.

This study revealed a composite picture of the course of renal tuberculosis from the tiny early caseous lesion through succeeding stages of progressive involvement and destruction of the kidney with cavitation going on to tuberculous pyonephrosis and ultimately, in some instances, terminating in autonephrectomy.

The authors believe that the initial lesions were of hematogenous origin and consisted of microscopic foci of typical tuberculous granulomatous cellular reaction. At that stage they probably presented no clinical or laboratory manifestations sufficient to attract the attention of the urologist. They progressed to a later stage with caseation and destruction of kidney parenchyma and the presence in the urine of pus cells and bacilli without attending clinical symptoms. It is conceivable that such early lesions might have healed by scar formation but the fate of the lesions in this series appears to have been one of progressive evolution to stages in which the possibility of healing did not exist. No healed tuberculous foci were demonstrated in the material examined, and, in the final analysis, one must conclude that if healing does not take place during the initial cellular phase of the tuberculous process, the subsequent course will be that of progressive involvement of one or both kidneys to the state in which renal function becomes grossly impaired, and results in a state of uremia and death.

Correlation of the clinical information given by symptoms, x-ray findings, and the pathological picture revealed that the clinical findings could not be depended upon to give an accurate picture of the extent of the pathological process. Kidney function tests were made, but were found to have little value either in revealing the extent of damage or life expectancy.

These sanitorium patients had routine cultures of their urines, which made it possible to discover renal tuberculosis in its early asymptomatic stage before the appearance of distressing tuberculous cystitis. In cases in which tubercle bacilli are demonstrated in the bladder urine by culture, complete urological studies are carried out including catheterization of the ureters and retrograde pyelography. If the ureteral specimen is positive and the pelvic outline shows cavitation, the kidney is removed even in the absence of bladder symptoms. If the pyelogram is normal a repeat cystoscopic examination is made and ureteral specimens are once more obtained for culture. If the second culture is positive for pus and acid-fast bacilli, nephrectomy is recommended. It is believed that the patient is suffering from clinical renal tuberculosis with an ulcerative lesion in communication with the kidney pelvis in spite of the normal pyelogram. A tuberculous pyonephrosis is removed if it is causing fever even though there may be an earlier stage of tuberculosis in the opposite kidney. This is the only instance in which bilateral renal tuberculosis is treated by operation.

The authors conclude that there were no areas of healing found in the surgical and autopsy kidneys examined in this series, and that clinical renal tuberculosis is treated by nephrectomy as soon as a confirmed diagnosis is made, even before pyelographic evidence of a cavity is found and before bladder symptoms occur. ROBERT O. BEADLES, M.D.

Aneurysm of the Renal Artery (Aneurisma de la arteria renal). PEDRO MOREYRA BERNAN and ALBERTO HALAC. *Rev. argent. urol.*, 1947, 16: 88.

The authors' patient, a 15 year old girl, had always felt a certain amount of pain in the lumbar region. About a month previously the pain became worse and now radiated to the epigastric region. Upon examination the only findings were bad teeth and pain on pressure over the right ureter and kidney pelvis. The right kidney seemed to be enlarged and was somewhat sensitive to palpation. The retrograde pyelogram revealed a renal pelvis with an odd rectilinear medial border and absence of the middle calyx, this portion being represented by a small rounded protrusion on the shadow border. In the middle of the pelvic shadow was a light area of rounded contour and about the size of a walnut. The kidney was approached through the lumbar region and the walnut-sized aneurysmal mass was disclosed beneath the renal vein, but on the anterior aspect of the renal pelvis. The mass was surrounded by numerous fine

blood vessels. The kidney changed color with pressure on the aneurysmal mass and fremitus was audible when the pressure was released.

The kidney and aneurysm were removed en masse and histologic examination of the aneurysmal wall showed that all of the layers of the arterial wall were present but with atheromatous changes between the intima and media. There was also evidence in the kidney itself of nephritic changes, congestion, and hemorrhagic suffusions.

This was the eightieth instance of aneurysm of the renal artery reported in the world literature.

In the discussion GARCIA reported the case of a well digger whose first symptom was the typical syndrome of Bunderlit (pain, tumor, collapse). Despite attempts to improve his general condition with intravenous infusions the patient died. Autopsy disclosed an enormous hematoma originating in the rupture of an aneurysm of the renal artery. In this case there was present an extensive degenerative condition of the aorta and a large aneurysm of this vessel.

ERCOLE related the personal observation of a calcified aneurysm of the renal artery in a patient who was suffering also from stone in the ureter, for which the operation which uncovered the aneurysmal tumor was done.

In closing the discussion, ALCORTA announced that Puigvert Gorro expects to report a case of aneurysm of one branch of a double renal artery. In this case it was possible to ligate the arterial branch in two places, remove the aneurysm, and thus save the kidney. The result of the operation was doubly fortunate in that this was the only kidney present.

JOHN W. BRENNAN, M.D.

Renal Rickets and Polycystic Disease. HERMAN L. KRETSCHMER. *J. Urol.*, Balt., 1948, 59: 773.

The term "renal rickets" suggests the coexistence of renal disease and rachitic changes. The underlying disease of this syndrome is in the kidneys. Changes may be primary, such as interstitial nephritis, pyelonephritis, congenital polycystic disease, or hypoplasia of the kidneys, or secondary to lesions of the lower urinary tract, such as congenital valves, stricture, and stones, which result in obstruction leading to bilateral hydronephrosis. As a result of these various lesions, prolonged renal dysfunction ensues and is followed by rachitic changes. The author presents a case history of a child who had bilateral polycystic disease of the kidneys which was followed over a period of 4 years, from 1935 until death of the child in 1939.

In 1935 a positive diagnosis of bilateral polycystic disease of the kidneys was made by exploration and biopsy. During the 3 years following biopsy the patient was admitted to the hospital 5 times and at the age of 3½, the child presented an extremely rachitic picture, was pale, had a rather large square head, sat in tailor fashion with the legs more or less bent, and had a large stomach and small limbs. An extreme rachitic rosary was present and the ends of the long bones were typically large. There was a marked Harrison's groove. The kidneys were easily palpable. This patient had been getting 3 teaspoons of cod liver oil daily since he was 3 weeks of age, and in the opinion of Brenneman the picture was that of renal rickets. The child died at the age of 4 years and 2 months. The pathological diagnosis was polycystic kidneys, chronic hepatitis, and edema of the liver. The autopsy was limited to the abdomen.

This syndrome has been designated as renal rickets, renal dwarfism, and renal infantilism. Such a diversity of terms has been employed because a multiplicity of disorders has been found underlying the syndrome. Barber, in 1920, was the first to give the most accurate description of this condition and he called attention to cases of interstitial nephritis in children associated with stunted growth, some of them with infantilism in all its characteristics and others merely with a marked degree of dwarfism, and suggested the term "renal dwarfism" until a more suitable name could be found.

The etiology and pathogenesis of this syndrome are not yet explained by any one hypothesis and much confusion exists. The principal theories presented have been the so-called renal, hyperparathyroid, pituitary-diencephalon, and, recently, the theory of acidosis.

The renal theory accepts the kidneys as the primary site of involvement in renal rickets. It suggests that there is relative or absolute inability of the kidneys to excrete waste endogenous phosphates from the body, that such wastes are excreted through the intestinal mucosa instead of from the kidney, and that such a concentration of phosphates in the intestinal contents may interfere with the absorption of calcium, presumably through the formation of insoluble calcium phosphates. This would result in blockage of the absorption of calcium from the food and the child suffers a true calcium starvation with resulting bone changes. This theory explains the skeletal decalcification but it does not account for the presence of dwarfism or retarded sexual development, nor does it account for the cases in which hypocalcemia is not pronounced.

The parathyroids have been suggested as being responsible for part of the pathological process because large parathyroids have been noted at postmortem in these patients. Because of the parathyroid relationship to the calcium metabolism and the changes which may occur secondary to renal disease, there have been many attempts to explain the findings of renal rickets by hyperparathyroidism. There is no doubt that the parathyroids do play a part in this clinical syndrome, which accounts for the variations observed in the calcium and phosphorus blood levels, and the type of bone changes found, but it is still difficult to evaluate their precise function.

In some cases a lesion in the pituitary gland is noted and it is thought that the clinical picture of this syndrome may be due to a pituitary-diencephalon lesion. Some of the characteristics of renal rickets, the dwarfism, the infantilism, and the polyuria, might be explained on the basis of a pituitary lesion,

inasmuch as both the growth-producing factors and the sex-stimulating factors are centered in this gland. The proponents of this theory believe that pituitary dysfunction could cause the dwarfism and that, secondly, an autonomic center in the adjacent diencephalon could cause urinary tract abnormalities in which there was no mechanical block. This would allow the chemical imbalance of the calcium and phosphorus metabolisms to result finally in a secondary parathyroid hyperplasia. However, the author states that in the case presented, the primary lesion was in the kidney and the rickets did not develop until 3½ years later.

There is at present a tendency to try to explain the syndrome on the basis of acidosis inasmuch as osseous lesions of a much milder type can almost regularly be found in adult cases of prolonged renal insufficiency. None of these theories, in themselves, will explain all the findings of this syndrome.

The disease occurs in childhood and early adulthood and both sexes are equally affected. The symptoms are failure to grow, bony deformity, enlargement of the epiphyses, the presence of Harrison's groove, rachitic rosary, difficulty in walking, increased weakness, polydypsia, polyuria and symptoms of uremia, and evidence of delayed sexual development. Kidney function tests will show impairment of renal function. The blood phosphorus is nearly always elevated, which is believed to be due to the inability of the kidneys to excrete the waste endogenous phosphates. The blood calcium may be low, normal, or even increased. Most cases terminate in uremia. However, no 2 cases are alike and, as Howard stated, "This is a disease of contradictions."

ROBERT O. BEADLES, M.D.

Adenocarcinoma and Tuberculosis of the Same Kidney. HAROLD A. NEIBLING and WALTMAN WALTERS. *J. Urol.*, Balt., 1948, 59: 1022.

A review of the literature, and especially of isolated cases presented since the last general review of the literature on the subject, together with a summary of 7 cases of combined tuberculosis and hypernephroma of the same kidney, is presented. All but one of the 7 patients whose cases are reported were males. The ages varied from 38 to 63 years, the average age being 50.1 years.

Surgical considerations and removal of the lesions presented primarily the same problems as those encountered in nephrectomy for hypernephroma or for tuberculosis, depending on which disease the combination found in this series most nearly resembled. The incisions used were posterolumbar, because it has been the consensus at the Mayo Clinic that most tumors of the kidney are as accessible by this approach as by the transperitoneal approach advocated by some authors for the removal of large renal tumors. The adequacy of the posterolumbar approach is illustrated by the relative ease with which the large tumor in 1 case was removed. This tumor was a cystic mass 24 by 16 by 16 cm. from which some 2,500 c.c. of fluid were aspirated by trocar.

Nephrectomy in all cases was carried out in the usual manner, the attempt being made to isolate and clamp the renal vein as early in the operative procedure as possible. When the lesion resembled a frankly tuberculous condition and there was concomitant ureteritis, partial ureterectomy also was done.

Pathologically, the malignant processes were mostly of low grade (Broders' method), with a preponderance of grade 1 lesions. This range of grade is in keeping with the observations of McDonald and Priestley, who showed that the majority of hypernephromas removed at the Clinic are of the lower grades (1 and 2) based on the Broders' method of classification.

The size of the tumors varied greatly from the smallest discrete hypernephroid lesion of 3 mm., to the largest tumor measuring 24 by 16 by 16 cm., in which the malignant process and the tuberculosis were intermingled indiscriminately.

It is also of interest to observe that most of the lesions contained discrete areas of hypernephroma in a tuberculous kidney or small portions of tuberculosis in a kidney mass composed chiefly of neoplastic tissue, and only in 1 case was there apparent an intermingling of tuberculosis and carcinoma.

The length of survival of the patients after operation is in close agreement with the general prognostic tables suggested by McDonald and Priestley in respect to hypernephromas.

It is noted that the diagnosis is directly related to that portion of the combined disease which predominates. In no recorded instance has the complete diagnosis been made preoperatively.

The prognosis probably is no better for the combined disease than it is for hypernephroma alone.

Ureterosigmoid Anastomosis (Ureterosigmoideoanastomosis). E. CASTANO, A. B. ORTIZ, and J. P. TORROBA. *Rev. argent. urol.*, 1947, 16: 319.

Brief case summaries of 9 patients with vesicular blastoma are presented. The patients ranged in age from 43 to 68 years. The presenting symptoms included hematuria, pollakiuria, cystitis, and dysuria. Cystoscopic examination revealed varying degrees of bladder involvement. Bilateral ureterosigmoid anastomosis was performed as a single stage operation in 5 patients and as a two stage operation in 3. One patient, the only operative mortality in the series, died in surgical shock within 24 hours after the right ureter had been transplanted. Follow-up pyelograms taken from 2 to 11 months after operation on 4 of the patients showed unilateral or bilateral ureteropelvic dilatation, or diminished or absent renal function.

Preoperative preparation of the patients began 4 days prior to operation with the administration of a purge. This was followed by daily cleansing enemas and a tablespoonful of mineral oil by mouth each evening at bedtime.

To effect sterilization of the bowel, sulfasuxidine or sulfaguanidine was given daily for 4 days prior to

operation in a dosage of 0.25 gr. per kilogram of body weight, divided into 6 or 8 doses. A few minutes before the patient went to the operating room, an enema of rivanol was given him, and he was brought to the operating table with the rectal catheter "*in situ*."

Except in cases in which contraindications existed, spinal anesthesia was used.

Postoperative precautionary measures consisted of the maintenance of hydration and homeostasis, and the administration of penicillin and sulfasuxidine for their combined effect upon the intestine and the urinary system.

In the immediate postoperative period great care was exercised to prevent paralytic ileus. For this purpose hypertonic saline solution was introduced into the intestine by way of the rectal catheter. The latter, which was left *in situ* from immediately prior to operation, also served the purpose of maintaining a ready exit for flatus and urine from the lower intestinal segment. Insistence was placed, above all, on the early passing of a Miller-Abbott tube. This insured a more tranquil postoperative period, eliminated abdominal distention, and prevented traction on the sutures.

The operative results are divided into three categories: immediate, intermediate, and late. The immediate period encompassed the time from operation until the patient abandoned his bed; the intermediate from that time until a year after surgical intervention; and the late, after one year.

In the immediate period there were no accidents related to disruption of the anastomosis or the development of urinary or intestinal fistulas. Healing per primam was observed, but no peritoneal reactions were noted. Immediate proctitis was avoided by careful attention to the rectal tube which was kept *in situ* for 5 or 6 days and reinserted if symptoms of proctitis presented.

Other than proctitis, there were no overt sequelae in the intermediate period. During this time emphasis was placed upon the patient's return to a normal social existence.

In the late period, that is, later than a year after surgical intervention, the patients who had been followed up through the three periods, began to feel the consequences of an unnatural function. Infection, which possibly had been present but well tolerated before, appeared as a crisis. Large dilatations of the ureters, pelves, and calyces, and rapid decadence of renal function occurred. Urinary systems which before had functioned perfectly, began to show signs of loss of their secretory and excretory functions. HAROLD W. BISCHOFF, M.D.

BLADDER, URETHRA, AND PENIS

Construction of Terminal Urethra in Hypospadias. JOSEPH H. KIEFER. *J. Urol.*, Balt., 1948, 59: 1169.

A procedure is presented in which the terminal portion of the reconstructed urethra is formed from a foreskin flap and brought through a tunnel to the dimple in the glans. The penis is straightened after a complete encircling incision is made, as advocated by Nesbit. This usually provides considerable excess of skin on the ventral surface. The excess varies from 1 to 5, or more, centimeters, according to the amount of the urethral defect and the length of the foreskin. The amount of excess is measured by stretching the penis to its full length and measuring the amount that will be required to reach from the hypospadic meatus to the dimple on the glans. The excess of skin which remains is measured and this measurement is the length of the tunnel.

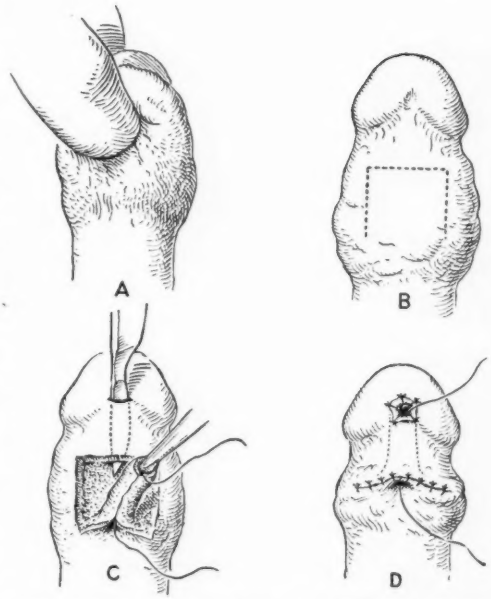


Fig. 1. A, Showing how loose skin is pulled distally to measure how much is needed to reach the dimple. B, Flap outlined. C, Flap formed into a tube and tunnel made. D, Tube drawn into place and sutured.

A skin flap is constructed (Fig. 1). This flap must be the same width in millimeters as the caliber of the desired urethra in numbers of the French scale. The tunnel is made by incising the dimple through the tissue of the glans and continuing under the remaining skin (Fig. 2.) Bleeding may be profuse at first but is easily controlled by pressure or the use of clotting agents such as thrombin solution. The flap which has been raised is then formed into a tube around a catheter by using a continuous subcuticular stainless steel suture. The tube so formed is then drawn through the tunnel and the edges are stitched to the adjacent edges of the glans at the dimple. The edges of the skin flap incision fall together quite naturally and are sutured with interrupted cotton or plastic silkworm gut. The catheter is removed and

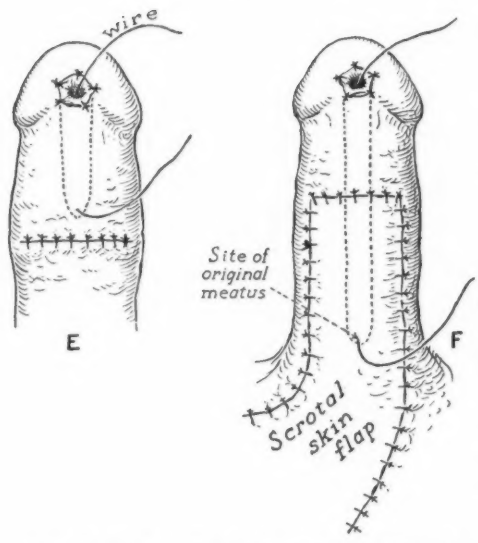


Fig. 2. E, (Kiefer). Showing how a complete procedure may be done at one operation if the defect is not great. F, When the defect is large, the method may be combined with the Duplay procedure. Only the distal portion of the new urethra can be brought through the tunnel. The large bare area is covered by a scrotal skin flap.

a pressure dressing is applied. Usually at this time a pedicled flap is raised on the scrotum for use at the final stage. When this is healed the patient has the terminal 2 or more centimeters of his urethra, and the intervening segment is constructed at the final operation by the method of Duplay. The bare area is covered by a scrotal flap without any tension or superposition of suture lines.

The portion of the urethra so constructed can easily be sounded or dilated when necessary.

The advantages of the method are that healing of the terminal portion is excellent and breakdown unlikely. It gives a normal appearing penis with the meatus in its proper position. The functional result is also excellent as the stream is normal and does not spray. FREDERICK A. LLOYD, M.D.

GENITAL ORGANS

The Prostatectomy of Terence Millin—The Operation of the Future (Prostatectomie de Térence Millin, opération d' avenir). H. DUVERGEY. *Bordeaux chir.*, 1947, No. 3: 133.

The author mentions first the advantages and shortcomings of the perineal and suprapubic methods of prostatectomy. The perineal method as practiced in the United States and Germany is an anatomical operation with perfect hemostasis and with less shock than the method of Freyer. Nevertheless, it is a delicate and occasionally difficult operation with certain dangers to the rectum and the possibility of fistula formation.

The Freyer operation is simple and rapid, but has the disadvantage of a transvesical approach with two wounds in the bladder. It proceeds in an infected medium, and is occasionally followed by shock and a painful postoperative course which requires close medical supervision.

There are two modifications of Freyer's operation, one by Fabre, with enucleation, complete hemostasis of the prostatic bed, and primary closure of the bladder with urethral catheter drainage. The other modification was made by Darget, with hemostasis secured by a balloon catheter and with perineal drainage and primary closure of the bladder. In contradistinction the operation (retropubic) by Terence Millin permits a direct approach by the shortest route without danger to the adjacent organs, such as the rectum and external sphincter, and no opening of the bladder. Due to the advancement made with sulfonamides and antibiotics, the danger from cellulitis in the space of Retzius is minimal. Hemorrhage can be controlled by electrocoagulation.

The author has operated on 5 patients; 2 were completely cured on the sixth postoperative day, 2 had a fistula, one closing on the fourteenth day, and 1 patient had complete retention of urine necessitating cystostomy. The author describes Millin's surgical procedure in detail with diagrammatic illustrations. The following highlights of his description are noted:

After the opening in the midline is made retropubically and a Harris automatic retractor is in place, two pads support each side of the prostate and hemostasis is achieved by electrofulguration. The capsule is incised transversely. Hemorrhage is controlled by aspiration. Enucleation is started laterally with scissors and continued digitally. Sharp transection of the urethra at the prostatic apex precedes the enucleation and sharp transection at the vesical neck completes it. Hemostasis of the prostatic arteries at 5 and 7 o'clock is done by fulguration. The vesical neck is dilated with a spreader and wedge-shaped resection of the posterior lip. A Nelaton catheter with two eyes is inserted and the capsule is closed with interrupted sutures. Sulfanilamide powder is applied, and except for the drain the wound is completely closed. One hundred cubic centimeters of sterile water are injected into the bladder and bilateral vasectomy is done. No postoperative irrigation of the bladder is necessary. The catheter and drains are removed after 3 days.

The blood loss during the operations varies from 100 to 400 c.c. No postoperative hemorrhage was observed. The urine became clear in 24 hours. This perfect hemostasis does away with packing and postoperative pain.

The asepsis of the operation is important. The bladder itself is hardly opened because of the competence of the sphincter at the vesical neck. This is best demonstrated by the injection of 100 c.c. of

water which are retained in the bladder. The postoperative course is therefore afebrile. In cases with severe infections prior to operation a two-way continuous irrigation, sulfonamides, and antibiotics will prepare a favorable field for intervention.

The urinary stream flows through the natural route and therefore fistula formation is reduced as compared with other operations.

There is no shock and the operation can be executed from within 20 to 30 minutes. The postoperative comfort of the patient is greater than that following other methods. From a practical consideration, hospitalization is shortened to only about 12 days. Because of all the advantages, the author believes that once an adenoma of the prostate is present this operation can be recommended to the patient prior to the onset of dysuria, polyuria, or the development of residual urine. This will lead to a broader indication and to early prostatectomy.

ERNEST BORS, M.D.

Rationale and Results in Retropubic Prostatectomy. OWSLEY GRANT and ROBERT LICH, JR. *Ann. Surg.*, 1948, 127: 1010.

Three methods of prostatectomy have been recognized up to recent months. The suprapubic operation has the highest mortality, is a blind procedure, offers no positive hemostatic control, and does not make possible the removal of an operable carcinoma. Transurethral resection is a procedure well adapted to small glands, median bars, and the inoperable obstruction of carcinoma. Prolonged pyuria, urethral stricture, and inadequate resection are the unfavorable aspects of this operation. Perineal removal is a truly surgical operation which offers positive hemostasis, the ability to remove carcinomas radically, low morbidity, and low shock. Fistulas and incontinence are the unpleasant sequelae.

In the hands of the authors, who have performed the largest series of retropubic prostatectomies in the United States, this operation has proved to be the procedure of choice for the removal of large glands, both benign and malignant. The transverse skin and fascial incision is preferred, and the space of Retzius is swept clean of fat. The vessels in the prostatic sheath are sutured and divided, and the prostatic capsule is incised transversely. A long pair of Mayo scissors is introduced into this wound and the adenoma loosened from its bed. The urethra is cut at the apex of the gland. The adenoma is then enucleated, from the apex toward the bladder. When

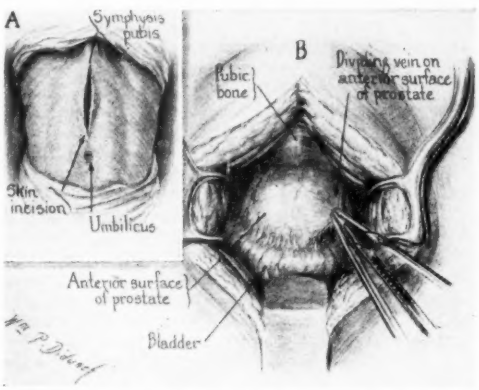


Fig. 1. A, Skin incision. B, Exposure of vessels in adipose tissue covering the prostatic capsule.

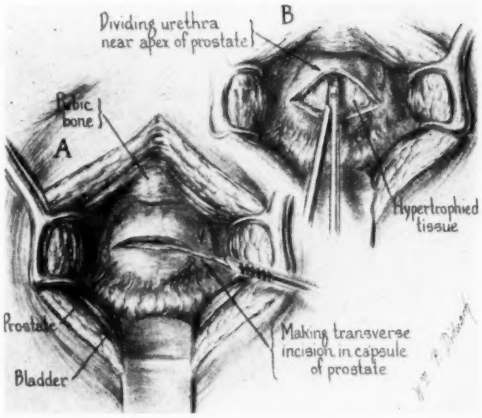


Fig. 2. A, Incision in the capsule between the ligated vessels. B, Division of the urethra at the apex within the prostatic capsule.

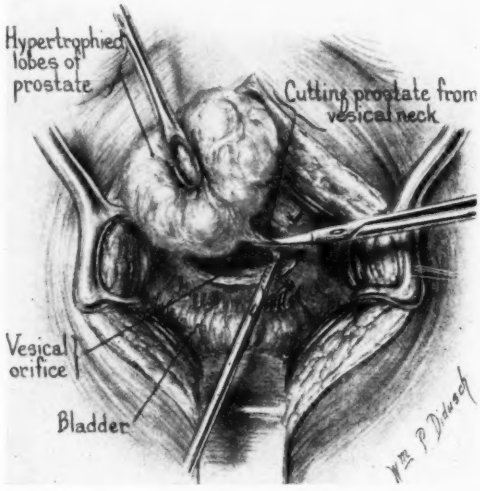


Fig. 3. The enucleated gland delivered being trimmed from the vesical neck.

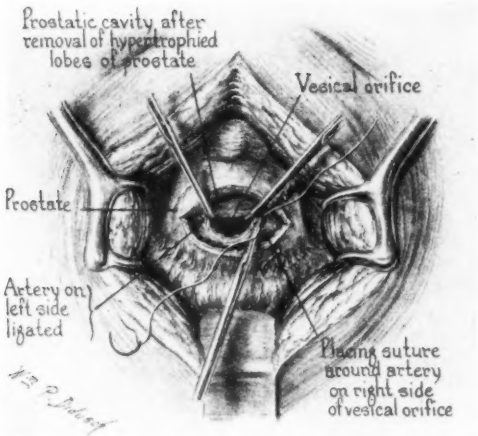

Prostatic cavity after removal of hypertrophied lobes of prostate
Vesical orifice
Prostate
Artery on left side ligated
Placing suture around artery on right side of vesical orifice

Fig. 4 (Grant and Lich). Ligation of the prostatic arteries.

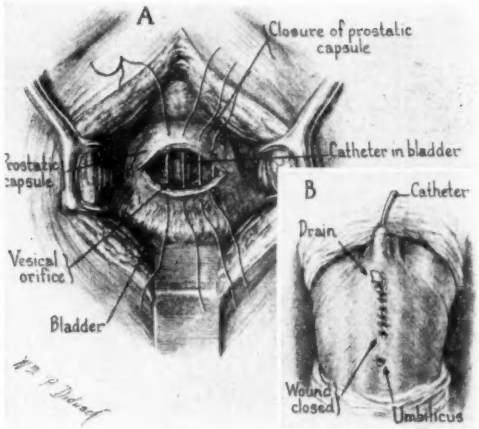


Fig. 5. A, Closure of the prostatic capsule over a retention catheter. B, Skin closure with cigarette drain.

the enucleation has reached the vesical neck, the gland is lifted into the wound and the cuff of bladder attaching it is severed. The prostatic arteries are seen and sutured, and any remaining bleeders are fulgurated. The bladder is explored with the finger for calculi or diverticuli. The prostatic fossa is inspected for nodules or tags. A catheter is then introduced into the bladder and the incision in the capsule is closed with a running suture. A rubber tissue drain is laid and the wound closed in the routine manner. The catheter and drain are usually removed on the third day.

In radical retropubic prostatectomy, the steps are the same up to the point of incision into the capsule. The puboprostatic ligaments are severed and the urethra is cut across. The gland with its intact capsule is then turned toward the bladder, which causes separation from the rectum and allows the seminal vesicles to come into view. The gland is then cut free from the vesical neck, and the seminal vesicles are removed with the rest of the specimen. Anastomosis of the bladder neck to the cut stump of the urethra, after hemostasis, completes the procedure.

The authors are well pleased with the results to date. Transfusion has seldom been necessary, and there has been no case of incontinence or fistula. Most of the patients left the hospital on the eighth postoperative day. JOSEPH E. MAURER, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Renal Osteodystrophy in the Adult (Osteodistrofia renal en el adulto). JOSE VALLS, FRITZ SCHAJOWICZ, and CARLOS DELBUE. *Rev. ortop. traumat.*, B. Air., 1947, 17: 8.

Two cases of renal osteodystrophy are reported with a detailed analysis of the clinical symptoms, course, roentgenologic, histologic, and chemical studies, bone involvement, and anatomicopathologic examinations.

Chronic renal insufficiency and uremia, normal serum calcium, hyperphosphatemia, and acidosis were observed in both patients. The urinary calcium was low, but the stool calcium was high. Osteitis fibrosa characterized the bony lesions of one patient with trabecular sclerosis not unlike Paget's disease, whereas the other case revealed only bony atrophy of the vertebrae and ulna.

Remission of the renal lesion was associated with a normal phosphatemia and increase of bone formations, but bony lesions, acidosis, and high calcium content in the stool followed long-standing renal insufficiency.

The relationship of parathyroid hyperplasia to the disease as found in the literature was discussed, although the parathyroid glands in the 2 patients studied could not be examined. Other features of the disease as outlined in the literature were summarized. STEPHEN A. ZIEMAN, M.D.

Osteoarthritis of the Cervicodorsal Spine (Radiculitis) Simulating Coronary-Artery Disease. DAVID DAVIS and MAX RITVO. *N. England J. M.*, 1948, 238: 857.

The authors analyze the clinical and roentgenological findings in 43 patients complaining of attacks of substernal or precordial pain of nerve-root origin (radiculitis). The location, character, and radiation of the pain closely simulated these findings in disease of the coronary artery.

The diagnosis of radiculitis was based on at least two of the following factors: attacks of pain in bed with change in body positions, and on coughing, sneezing, or straining at stool; reproduction of the attacks by pressure over the dorsal spine; and a striking response to orthopedic therapy.

In addition to the generally recognized features of radiculitis of the cervicodorsal spine, particular attention is called to the occurrence of a peculiar respiratory distress of radicular origin that may easily be mistaken for a manifestation of heart disease. The value of parasternal tenderness as a sign of dorsal root irritation is also emphasized.

The patients, in addition to irritation of the dorsal nerve root, showed a high incidence of symptoms and signs of cervical radiculitis, such as pain in the shoulder girdle, suboccipital headaches, vertigo, muscle spasm, tenderness, and limitation of neck rotation.

Roentgenological examination of the dorsal and cervical spine showed a high incidence of postural and osteoarthritic changes. The changes in the cervical spine may be summarized as follows: disk narrowings, 18 cases; anterior osteophytes, 39 cases; posterior osteophytes, 23 cases; osteoarthritis of the intervertebral joints, 11 cases; scoliosis, 31 cases; straightening, 23 cases; increased lordosis, 5 cases; kyphosis, 1 case; and osteoporosis, 22 cases. In the dorsal spine, there was disc narrowing in 7 cases, anterior osteophytes in 39, posterior osteophytes in 4, and scoliosis in 30.

The roentgenologic findings demonstrate the location, nature, and extent of the osteoarthritic changes in the spine and are of some value to the clinician when the symptoms are of short duration, the attacks cannot be reproduced, or the radicular characteristics are not clear.

The recognition of radiculitis and its differentiation from coronary disease of the artery are of practical importance in therapy and prognosis.

DANIEL H. LEVINTHAL, M.D.

Symmetrical Equal Bilateral Epiphyseal Separation of the Distal Radial Epiphysis (Distacco bilaterale e simmetricamente uguale dell'epifisi radiale inferiore). PASQUALE FICARA. *Ann. Ist. osp. Aquilani*, 1946–47, 1: 257.

The author reports a single case of bilateral separation of the distal radial epiphysis which was probably unique because of the fact that the separation was of the same degree on both sides. Superimposition of the films showed the identical displacement.

The patient was a boy 16 years of age, who, while sawing a limb off a tree, fell and struck both arms against the ground. Under local anesthesia the posterior radial displacement of the epiphyseal fragments was reduced and the arms were placed in circular plaster casts.

The author discusses the bibliography, terminology, pathologic changes and treatment of this condition. CARLO SCUDERI, M.D.

Low Radioulnar Dyschondroplasia, or Madelung's Disease (Discondroplasia radio-cubital inferior o endermedad de Madelung). ALBERTO INCLÁN COSTA. *Cir. ortop. traumat.*, Habana, 1946, 13: 68.

Three cases of Madelung's disease in which surgical procedure gave satisfactory results are presented. All the patients were young females, 2 of whom had serious endocrine imbalance. There was no history of infection or injury; however, 1 patient used considerable force while practicing on the piano.

The pathogenesis suggests numerous theories, such as the mechanical, traumatic, muscular contraction

following infection, endocrine, and hereditary. Because the symptoms are more objective than subjective, and are insidious in character, it is believed that the deformity is best studied by means of roentgenography.

Because of the progressive nature of the disease, conservative methods of treatment are not satisfactory.

Surgical intervention consisted of corrective osteotomy of the radial incurvation, shortening of the ulna with raising of the head of the ulna, and transplantation of the bony fragments obtained to the lower and inner portion of the osteotomized radius. No second surgical procedure has been required in these cases. STEPHEN A. ZIEMAN, M.D.

Osteochondritis Dissecans of the Hip (Osteocondritis disecante de la cadera). JOSE VALLS and DOMINGO T. MÚSCOLO. *Rev. ortop. traumat.*, B. Air., 1947, 17: 47.

The authors discuss 5 cases of osteochondritis dissecans of the hip. They believe that trauma has little to do with producing the lesions because they were unable to find in the literature any indisputable evidence of direct relationship. Furthermore, approximately 30 per cent of the cases are bilateral, and not infrequently Perthes' disease coexists. Certainly none of the 5 patients was exposed to sufficient trauma to bring on the lesion.

Clinically, the process may be confused with chronic rheumatism. There are no specific features of the disease. Most cases present a slow and painful course. Roentgen examination reveals the only distinctive characteristic, the lesion being practically always found in the upper lateral portion of the head of the femur.

Treatment utilizes physical therapy, immobilization, simple sequestration, arthroplasty, and arthrodesis.

Three of the authors' patients were operated upon; the first developed arthritis deformans; the second recovered completely after 2 years; and the third has been operated upon too recently to permit appraisal of the results. A fourth patient, treated conservatively, is well after 7.5 years.

STEPHEN A. ZIEMAN, M.D.

Popliteal Hygromas (Higromas Poplíteos). LEONICIO LUIS FERNÁNDEZ. *Cirugia*, 1947, 1: 141.

The majority of tumors which develop in the popliteal space are hygromas of the serous sac of the semimembranosus and internal hamstring muscles (popliteal cysts, cysts of Baker). These tumors appear at the level of the crease behind the knee, and, after they have expanded into the lower portion of the popliteal space, expand upward over the posterior area of the thigh.

These cysts are located medially and never in the midline, a fact which distinguishes them from synovial herniations. Their surfaces are smooth, and at times indented when they increase in size. They are tense and elastic.

The skin which covers these popliteal hygromas is not modified except in the presence of very large cysts in children, when it becomes thin and transparent. The cysts are not painful and are usually found inadvertently by the patient or in the course of routine physical examination.

The differential diagnosis is between aneurysms of the popliteal vessels, lipomas, and synovial hernias.

The most important of these is the first and this is easily eliminated by the absence of palpable fremitis and bruit. By puncture of the cyst with a needle of large caliber, a thick, syrupy pale yellow liquid can be obtained. The use of a needle which is too small often leads to an erroneous conclusion.

Radiological examination of the knee is almost always negative. It is not rare, however, to see signs of arthritis in older patients. Filling of the cysts with lipiodol or air will define the limits of the sac; however, this is not necessary to establish the diagnosis.

The greatest incidence of popliteal hygromas is in males over 45 years of age and in boys less than 12 years of age. In the older age group there is a tendency of the cysts to appear abruptly.

Radical treatment consists of complete surgical excision of the hygroma. In older persons one may resort to palliative evacuation of the cyst by puncture and continuous application of a compression bandage. The use of injections of irritating liquids is contraindicated.

The incision of choice is transverse and is made at the equator of the tumefaction. When the development of the hygroma is such that it extends downward in the popliteal space, the transverse incision is placed at the level of the interarticular line. The surgical draping of the leg should be so arranged that the leg may be flexed during operation without danger to asepsis.

Flexion of the extremity is necessary at certain times during the operation in order to relax the muscles and tendons which are at their maximum tension in the position of extension.

The anesthesia of choice is local.

After incision of the skin a small subcutaneous dissection is made to expose the aponeurotic plane clearly. An incision is then made in the fascia of the exact size of the skin incision, since it is this tense connective tissue which adds to the difficulties of exposure and dissection of the deepest portion of the hygroma. Upon sectioning the aponeurotic plane, one will encounter the external saphenous vein at the medial end of the incision. This may be retracted medially if the hygroma is of moderate size, or sectioned between two ligatures if the hygroma is large.

Immediately beneath the aponeurotic plane one encounters the hygroma. Separation of the tumor is begun along the lateral border and continued at the inferior pole. After this the medial border is separated. Here the hygroma is intimately adherent to the tendon of the semimembranosis; however, it may be separated by careful dissection.

In general, when the cyst is dissected one observes that the wall of the tumor is adjacent to, and adheres

to the facial planes and tendons, is covered with adipose tissue, and is easily separated from the muscular planes.

Almost invariably, upon separation of the hygroma from the covering of the medial hamstring tendons, it is opened. The opening and evacuation of the contents favor final dissection.

The separation of the cyst is continued superiorly and deeply, the operator being guided by the tendon of the semimembranous and the tendonoaponeurotic fibers of the superior pole of the medial hamstrings. Separation of the cyst at its uppermost border almost invariably leaves a small foramen in the synovial covering of the cartilage of the medial condyle of the femur. This does not signify pre-existence of a communicating foramen.

The operation is completed by careful suture of the fascial layer and skin. There are no special postoperative precautions.

HAROLD W. BISCHOFF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Bridging of Bone Defects. A. GIBSON and B. LOADMAN. *J. Bone Surg.*, 1948, 30-A: 381.

The authors report the methods used and the results obtained in bone-grafting operations for defects and nonunion of the bones of the extremities on 105 patients at Deer Lodge Hospital, Winnipeg, Canada. All the patients operated upon were good surgical risks. In 85 per cent of the cases, the injury was caused by a gunshot wound. Accidents of various types, many involving motorcycles, were responsible for the remainder. All but a few of the injuries occurred overseas and consequently there was an interval of several months between the time of injury and admission to the hospital.

Early in the series, the cortical inlay or onlay graft, with some cancellous bone from the upper end of the tibia, was used in almost every case. Later, when more had been learned about iliac cancellous bone, this type of graft was used more frequently, either by itself or in combination with other methods. The results obtained from the various methods are tabulated in the article.

Union occurred in 93 cases. Penicillin was used routinely after every operation, and no graft was lost or failed to unite because of primary wound infection. In 84 patients, or 80 per cent of the cases, the first graft was successful. The cortical onlay graft was used 29 times in 27 patients, and union resulted in 23 patients, or 79 per cent of the cases. The cortical inlay graft was used 27 times in 25 patients, and was successful in 22, or 81 per cent of the cases. Cancellous bone alone was used 23 times in 23 cases, to fill gaps, or to promote union in ununited fractures; union occurred in 20 patients, or 87 per cent of the cases. Combined with a metal plate, it was used 13 times on 13 patients, with union in 9, or 69 per cent of the cases. It was used 9 times in incomplete defects of the shaft of the long bones, and fused with the shaft in 7 patients, or 78 per cent of the cases. In 12 cases cancellous bone alone was used to fill infected bone cavities with discharging sinuses. Wound healing occurred in 9 cases.

It was concluded that for ununited fractures, or for short gaps in the shaft of the radius, ulna, humerus, and femur, the cortical onlay graft, fixed with vitallium or stainless steel screws, is the most efficient. Cancellous bone should be placed between the fragments and around the cortical graft. In the upper end of the shaft of the femur, it should be combined with a metal plate or with a second onlay graft. In the ulna, if the size of the gap is 3.8 cm. or more, or if the fragments are difficult to control, a Lane plate, used with the cortical onlay graft, may prevent absorption and fracture of the graft.

The sliding inlay cortical graft gives excellent results for ununited fractures, or defects of 5 cm. or less in the shaft of the tibia.

Cancellous bone alone will bridge a bone defect, or promote union in ununited fractures in a high percentage of cases. However, before function can be allowed, longer immobilization must be expected than if a cortical graft has been used. Combined with a metal plate, union may be slightly less certain, but plaster immobilization is shorter. Its most practical use is in filling incomplete defects in the shafts of the long bones.

Infected bone cavities can be filled with cancellous bone and a high proportion of successful results can be anticipated if full thickness skin can be closed over the cavity and graft. This method may prove useful in the treatment of osteomyelitis of the tarsal bones.

RUDOLPH S. REICH, M.D.

FRACTURES AND DISLOCATIONS

Primary Closure of Compound-Fracture Wounds. With Immediate Internal Fixation, Immediate Skin Graft, and Compression Dressings. ARTHUR G. DAVIS. *J. Bone Surg.*, 1948, 30-A: 405.

A review of 50 consecutive cases of compound fracture was presented in 1942, treatment of which consisted of immediate débridement, metallic internal fixation, skin grafting, and compression dressings.

The present report is based upon a series of 150 consecutive cases of compound fracture, observed during the 11 year period from 1936 through 1946. During the first 5 years, when neither sulfonamides nor penicillin were available, 28 patients were treated. In the next 4 years, 83 patients were treated with sulfonamides. In the final 2 years, 39 patients were treated parenterally with penicillin; in addition, in these cases a sulfonamide was dusted into the wound. During the last 5 years a blood bank has facilitated the generous use of transfusions, and a high protein diet has been prescribed.

Except for modifications attending the advent of the newer bacteriostatic agents, the blood bank, and the high protein diet, the program of treatment described in 1942 has undergone no important change.

Greater experience, however, has taught the value of a more radical excision of questionable skin. With the adoption of this policy, it has been possible to reduce the incidence of sloughing of the wound edges and subsequent infection. Improved techniques in the transfer of split grafts, together with the use of the Padgett dermatome, have facilitated the grafting of large denuded areas.

Because of variables involved in the individual case, it is extremely difficult to evaluate the merits of any single approach to the treatment of compound fractures. It is sometimes impossible and frequently inadvisable to do combined immediate treatment of shock, débridement, internal fixation, and closure. Six case reports are given, in which different approaches have been used, in accordance with the immediate requirements of the individual patients.

In respect to wound healing, bony union, prompt restoration of function, and the salvaging of extremities, the results have been superior to those obtained by previous methods. Improved results are attributed: first, to the compression dressing; second, to immediate coverage of the surface defect with skin or a split skin graft; and third, to immediate or delayed internal hairline reduction with metallic fixation when indicated.

The hazard of primary suture is greatly reduced by penicillin and the availability of whole blood. Healing by first intention has been more frequent since the adoption of more radical excision of partly or wholly devitalized skin flaps. Temporary removal of the tourniquet has been found to be the only dependable aid in evaluating the vitality of the skin.

A thorough knowledge of and versatility in skin plastic surgery are important for selection of the optimum covering of the individual skin defect. Preference is given to the approximation of relaxed flaps, whenever possible. Defects caused by relaxing incisions are covered, immediately or later, by split grafts.

Evaluation of the end-results of compound fractures is facilitated by photographs of the external wound, made at the time of the usual admission roentgenogram, and repeated 2 weeks later at the time of the first dressing.

An attempt has been made to evaluate the therapeutic indications in each case on admission and to determine the factors which require immediate treatment. Definitive fracture treatment should frequently be postponed. It is usually advantageous to carry out simultaneously the treatment of shock and a careful débridement, followed immediately by closure of the skin and the application of a compression dressing. RUDOLPH S. REICH, M.D.

The Management of Compound Dislocations. JAMES K. STACK and PAUL MILLIGAN. *Q. Bull. Northwest. Univ. M. School*, 1948, 22: 106.

The authors have reviewed the literature of compound joint injuries, and describe the method of treatment of compound dislocations as exemplified in their 12 cases.

Compound injuries to joints are, of course, emergencies, and treatment is carried out as early as possible in the operating room under general anesthesia and with a tourniquet. If a state of shock exists, the treatment for this may be carried out concurrently.

The wound and protruding bone ends are covered with sterile gauze, the skin area is shaved and thoroughly cleansed with soap and water, and a skin antiseptic is applied up to the wound edge. The extremity is then draped and the wound débrided. It is usually necessary to enlarge the wound. Tissue into which dirt has been ground must be sacrificed, and it is the inadequate or timid performance of this step in the procedure which is the most common cause of subsequent sepsis. If the bone end is dirty, it is best to remove about one-eighth inch with a thin sharp osteotome. If dirt has been ground into the articular cartilage, layer after layer should be shaved off with the scalpel until the uninvolved base is reached. Following this the wound is gently irrigated with saline solution, and closed. It is essential that the joint be covered and thoroughly protected, even if fascia is required to make a water-tight compartment. Prior to closing of the skin, penicillin solution may be injected into the joint cavity. Wounds heal best if a compression bandage is used, and immobilization is usually obtained by means of a plaster cast. VERNON C. TURNER, M.D.

The Magnuson-Stack Procedure for Recurrent Dislocations of the Shoulder. N. J. GIANNESTRAS. *Surgery*, 1948, 23: 794.

The theories in favor and against repair of recurrent dislocations of the shoulder are discussed. The Magnuson-Stack procedure is given in detail including the operation.

Thirty-one shoulders in 30 patients were operated on by the author. Sixty per cent showed evidence of avulsion of the capsule from the glenoid rim. There have been 2 recurrences to date.

At the time the article was written 27.6 per cent of the patients had definite limitation of external rotation. The remaining 72.4 per cent had a trace or no limitation of external rotation. Abduction was limited in 5 patients. Two patients showed a loss of forward extension. Eight patients reported the presence of pain. Seventy-seven and one-half per cent had painless shoulders.

This procedure was successful in 91.6 per cent of the patients in the present series of cases, with a minimum follow-up of 1½ years.

RICHARD J. BENNETT, JR., M.D.

Mechanism of Fracture of the Carpal Scaphoid (Mecanismo de fractura del escafoides carpiano). HECTOR DAL LAGO. *Rev. ortop. traumat.*, B. Air., 1947, 17: 66.

Direct trauma may produce fracture of the carpal scaphoid but this occurrence is apparently rare. A

direct blow over the anatomic snuff box area or anterior surface of the wrist may result in fracture. However, this article is concerned chiefly with fractures occurring after indirect traumatization. The fracture occurs while the hand is in flexion or at a closed angulation, or while the hand is in extension or at an opened angulation.

In the latter, the hand is in hyperextension as regards the semilunar bone and the first row of carpal bones, and the second row of bones is displaced posteriorly.

The indirect trauma includes: (a) avulsion of the tuberosity by ligamentous strain; (b) closure of the angle in the frontal or sagittal plane (in the author's opinion there is a closure of the frontal angle instead of the sagittal angle); (c) divergent compression or compression of the body of the navicular bone by torsion (this is considered an original view); and (d) opening of the sagittal angle (this is the type of fracture that usually accompanies dislocation of the lunate). STEPHEN A. ZIEMAN, M.D.

Fatigue Fractures of the Fibula. H. JACKSON BURROWS. *J. Bone Surg.*, 1948, 30-B: 266.

Fatigue fractures are spontaneous fractures of seemingly normal bone. They appear to result from a summation of stresses, which singly are insufficient to produce fracture.

The author reviews the literature concerning fatigue fractures of the fibula and reports several personal cases. The fractures occurred 1½ inches above the tip of the malleolus in the 5 women observed by the author and at a slightly higher level in 2 male patients.

Repetitious activity, movement in walking, running, and skating produced the symptoms of pain, stiffness, localized tenderness, and at times localized swelling. Sometimes there is slight redness and increased local cutaneous temperature. Limp and atrophy were rare. Few patients showed limited ankle and tarsal movement.

During the first 15 days or more there are no radiographic changes in most cases but occasionally a fracture line may be evident after a week. At times there is a band of rarefaction. Callus may be observed at the end of a week in children and during the third week in adults. A dense band is often the first indication of the fracture site and almost the last to disappear. The diagnosis is often confused with osteomyelitis, tuberculosis, congenital syphilis, sarcoma, and myositis ossificans.

The author recommends elimination of the exciting activity and the pursuit of normal function with the aid of an elastic adhesive bandage from the metatarsal heads to the upper calf.

Cases of "pseudofractures" in the upper third of the fibula have been reported by others, usually occurring in soldiers, especially infantrymen. Several cases of similar fractures in the middle third of the fibula have been reported. Fatigue fractures of the fibula may be bilateral.

DANIEL H. LEVINTHAL, M.D.

ORTHOPEDICS IN GENERAL

Acute Circulatory Failure in an Injured Limb. D. LL. GRIFFITHS. *J. Bone Surg.*, 1948, 30B: 280.

Sudden arrest of the circulation in a limb is a catastrophe of particular interest because, apart from embolism and arterial disease, this emergency is almost confined to the vascular complications of fractures and dislocations. Crushing injuries of a limb and accidents after the use and abuse of tourniquets are rare.

Ischemia threatening an injured limb gives rise to the syndrome of pain, pallor, paralysis, and pulselessness. It is due to arterial injury by lacerations, compressions, intramural rupture, or contusion, or to arterial spasm with or without demonstrable local arterial damage. The differentiation of spasm without local injury from organic obstruction is not possible by clinical methods.

Unfortunately, complete arrest of the arterial circulation of an injured limb is seldom recognized until too late. Effective action is too often delayed.

Vasodilator drugs have been disappointing. Eupaverine is probably useful; papaverine is certainly not. Tetraethyl ammonium bromide is still on trial. It promises well as a means of paralyzing the sympathetic, but it has potential dangers. Heparin and other anticoagulants may be indicated to prevent or limit thrombosis. Alkalies are of great value, and should always be given as a protection against renal failure. The only other useful drugs are morphine and other sedatives, which should be used freely.

The suggested plan of treatment and of management is:

1. General systemic investigation of the blood pressure, blood count, and coagulation time.
2. Removal of all external pressure.
3. Resuscitation.
4. A direct attempt to relieve the obstruction by operation.
5. Postoperative care.

The operative procedure recommended is:

1. Manipulative reduction of the fracture if possible.
2. Proximal control of the artery.
3. Arteriography.
4. Exposure of the occluded artery (unless contraindicated by time factors and by the anatomy of the collateral circulation), liberation and mobilization of the vessel, repair by suture when this is necessary and possible, and arteriectomy, only for irreparable local damage.
5. The provision of sympathetic block by injection or by sympathectomy.

In the postoperative care, in addition to the alkalies, penicillin should be given as a routine measure. The limb should be slung on some open form of splintage, but not compressed. It should be slightly elevated, and kept cold, not iced. The rest of the body should be heated. Smoking is prohibited, but alcohol may be used as a vasodilator.

DANIEL H. LEVINTHAL, M.D.

Acute Hematogenous Osteomyelitis. A Study of Treatment. WILLIAM NACHLAS and HERBERT R. MARKHEIM. *J. Bone Surg.*, 1948, 30-A: 673.

Presently we are confronted with two diametrically opposite forms of treatment for acute hematogenous osteomyelitis: first, the systemic or antibiotic treatment, and, second, early surgical intervention with evacuation of the osteomyelitic abscess. Both treatments are good and have equal support from their advocates.

The present study was undertaken to determine the relative merits of emergency versus delayed surgical treatment and combined chemotherapy—antibiotic treatment. Based upon the roentgenographic evidence, local and constitutional manifestations, and blood cultures, 130 cases lend themselves suitable for this study. Seventy-eight of 130 patients were treated by emergency surgery, 32 by delayed surgery, and 20 by chemotherapy.

For each of the above categories the authors sought a comparison relative to (1) mortality, (2) duration of disease, (3) recurrences, and (4) metastatic bone lesions. The mortality rate was as follows: emergency surgery, 9 per cent; delayed surgery, 3 per cent; chemotherapy, none. Duration of the disease disclosed: an average of 714 days for the emergency surgery, 360 days for the delayed surgically treated cases, and 169 days for the chemotherapy group. Recurrence, in the same order, was 40 per cent, 22 per cent, and 10 per cent, respectively. Metastatic bone lesions occurred in 23, 22, and 10 per cent, respectively.

From the current investigation, the authors made the following observations:

1. The best results were obtained in patients treated via systemic approaches.

2. Delayed surgical treatment was not fraught with danger or increased morbidity.

3. The distribution of mortality was none among the systemically treated patients, 1 in the delayed surgery groups, and 7 in the emergency surgery group.

4. Early diagnosis and early antibiotic treatment should be established.

5. Surgical treatment of bone abscesses should be delayed and deferred when possible. Small osteomyelitic abscesses have the ability to absorb without surgical measures.

6. Chemotherapy and antibiotic therapy should be extended 2 weeks after the cessation of septic manifestations. Too early a withdrawal of these drugs has, in the hands of the authors, resulted in acute exacerbations of the disease.

Discussions by Phemister, Dickson, Seddon, Farmer, Altemeier, and Nachlas follow the article.

SAMUEL L. GOVERNALE, M.D.

The Surgical Treatment of Intractable Plantar Warts. JAMES A. DICKSON. *J. Bone Surg.*, 1948, 30-A: 757.

Whereas 90 per cent of the plantar warts respond to a conservative regimen, the remaining 10 per cent require radical treatment. Verruca plantaris varies in depth, size, and location. It may extend to the plantar fascia, tendon sheaths (with ulceration), and to the metatarsal heads, producing intractable pressure pain.

Undoubtedly, some plantar ulcerations are produced by escharotics, x-rays, and electrocoagulative treatments. Such large ulcerating areas, obviously, are not amenable to simple excision. Radical treatment, such as excision of the involved metatarsal head with its corresponding toe should be the treatment of choice.

In residual large plantar skin defects, the author recommends whole-thickness skin grafting, in addition to wedge-shaped excision of the skin and partial or total metatarsectomy.

Sesamoidectomy with removal of the warty area may be indicated in cases in which these bones are out of line and are producing the ulcerations.

Twenty-five patients have been operated upon by the author. This treatment is recommended only in resistant cases. SAMUEL L. GOVERNALE, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Segmental Arterial Spasm Associated with Supracondylar Fracture of the Elbow: Report of a Case. A. DALE CONSOLE. *Surg. Clin. N. America*, 1948, 28: 467.

Segmental arterial spasm, described in the literature as arterial stupor, traumatic segmentary inhibition of the arteries, arterial contusion, etc., is a relatively rare but serious condition in civilian practice. The physician must be alert to the diagnosis lest a salvageable limb be lost.

The case is reported of a supracondylar fracture of the elbow in an 8-year-old boy who, 4 hours after closed reduction and Kirschner wire traction, maintained cold, discolored fingers. Eighteen hours later, in spite of repeated attempts to manipulate the fragment thought to be impinging on the brachial artery, the appearance had not changed. Operative exposure revealed a contused artery in marked spasm which did not lessen when the fragments were easily and exactly realigned. Dramatic improvement, however, was observed within 30 minutes following a 2 per cent procaine paravertebral sympathetic block. Twenty months after treatment the patient had an excellent anatomic and functional result.

Paravertebral sympathetic block should be employed early in the condition for its diagnostic and therapeutic actions, for, regardless of the disputed etiology of the condition, sympathetic paralysis constitutes the most rational means of attack. Periarterial sympathectomy and resection of the involved segment of vessel are ineffective, sometimes difficult, and of limited value. Operative intervention may often make a bad situation worse. Such a case, in which open reduction was accomplished in the presence of marked vasospasm, is cited to illustrate that a limb may be lost under such circumstances.

ALLAN D. CALLOW, M.D

"Functional" Subclavian Arterial Murmur: Possible Relation to Scalenus Anticus Syndrome, Costoclavicular Compression, or the Neurovascular Syndrome of Wright. JAMES D. MURPHY and R. BERNARD POMERANTZ. *Ann. Surg.*, 1948, 127: 685, 688.

During the course of routine examination of 2,619 applicants for positions 21 patients came to attention because of a systolic murmur over the subclavian artery. The patients were predominantly young females who presented no abnormal findings on physical examination and had no symptoms.

The murmur occurred with greater frequency on the left side than on the right and was occasionally present on both sides. The murmur was loud and constant when the examination was performed while the patient's hands were held on the hips, was less frequently heard in the relaxed sitting position, and was absent in the recumbent position. Abduction of the arms increased the intensity of the murmur up to abduction from 135 to 150 degrees when the murmur disappeared altogether because the blood flow to the arm as ascertained from the radial pulse and blood pressure had been obliterated.

When the murmur occurred on one side only it was noted that abduction of the arms caused a greater fall in the blood pressure in the arm on the side of the murmur than in the other arm.

The author believes that one case was due to costoclavicular compression, and the others probably represented the neurovascular syndrome of Wright.

THEODORE B. MASSELL, M.D.

Portacaval Shunts in the Treatment of Portal Hypertension. ROBERT R. LINTON. *N. England J. M.*, 1948, 238: 723.

In the treatment of portal hypertension the most satisfactory portacaval shunt seems to be an end-to-side suture type of splenorenal anastomosis performed at the same operation at which the spleen is removed. Four cases of Banti's syndrome are presented in which various other types of procedures had previously been attempted without success. Three of the patients had splenectomies, so that the splenic vein was no longer available for anastomosis.

Other types of portacaval shunt were performed, such as anastomosis of the superior mesenteric vein to the inferior vena cava in one case and of the inferior mesenteric vein to the left ovarian vein in another case. Twenty-two and 14 months, respectively, have passed since the shunts were performed without evidence of esophagogastrointestinal hemorrhages.

The patient who was not splenectomized had been subjected to an extensive intraperitoneal omentopexy and ligation of the splenic artery. Despite the dense adhesions resulting from these procedures, a successful splenorenal shunt was performed.

A direct portacaval anastomosis was not possible in 3 of these cases because of a cavernomatous transformation of the portal veins.

It is suggested that splenectomy should not be done for portal hypertension unless one is prepared to do a splenorenal anastomosis at the same operation, since this may be the only opportunity to construct a satisfactory shunt.

THEODORE B. MASSELL, M.D.

Aneurysm of the Left Common Iliac Artery Secondary to a Traumatic Arteriovenous Fistula of the Left Popliteal Vessels. J. M. DONALD. *Ann. Surg.*, 1948, 127: 780.

The author introduces this case report because of the infrequency of accounts of an aneurysm developing proximal to an arteriovenous fistula. This patient suffered a bullet wound of the left popliteal

region 43 years previously and developed a pulsating mass in the popliteal region with swelling of the extremity. Varicosities developed, and a subsequent ulcer which healed with difficulty. Pigmentary changes in the skin also occurred. More recently evidences of myocardial insufficiency were noted. In the past year a pulsating mass appeared in the left lower abdominal quadrant and became progressively larger. Examination revealed findings of an arteriovenous fistula in the left popliteal region, aneurysm of the left common iliac artery and cardiac enlargement with myocardial damage. The arteriovenous communication was excised by a double ligation proximal to the fistula and a quadruple ligation (anterior and posterior tibial vessels) distally. Eighteen months postoperatively the iliac aneurysm had decreased to one-third of its original size and there was no clinical evidence of myocardial disease.

In his discussion the author points out that proximal arterial dilatation occurs in the majority of long-standing cases; this enlargement with the increase in blood flow is an effort to compensate for the relative ischemia existing distal to the fistula. The enlargement of the artery is directly proportional to (1) the size of the fistula, (2) the volume of blood short-circuited into the venous system at the fistula, and (3) the duration of the fistula.

Degenerative changes in the artery proximal to an arteriovenous fistula occur commonly, and aneurysmal dilatations are thus a potential complication in all long-standing cases. The degree of improvement of such an aneurysm after elimination of the fistula will depend on the amount of damage which has already taken place in the artery and which may be irreversible. EDWARD H. CAMP, M.D.

Aneurysm following Surgical Procedures. DANIEL C. ELKIN. *Ann. Surg.*, 1948, 127: 769.

The purpose of this article was to demonstrate the possibility of arterial injury in the course of operation, eventuating in an aneurysm or arteriovenous fistula. From a review of the literature on this subject it seems evident that an arteriovenous communication may be produced in any operation, but it is most likely that the lesion is produced when vessels are transfixed and ligated, an artery and vein being injured simultaneously by the needle and an opening made through which the communication is established. Care should be taken that no more than a single vessel be included in a transfixion suture.

In a personal series of approximately 650 operations for aneurysm and arteriovenous fistula, the author noted that 6, or approximately 1 per cent, of the cases followed some operative trauma. Five of these cases are reported in detail, 2 being false aneurysms of the brachial artery, one following venepuncture and the other following incision and drainage of an abscess; 1 was a false aneurysm of the external iliac artery following herniorrhaphy; 1 was an arteriovenous fistula of the facial vessels following procaine injection for dental extraction; and 1 was an arteriovenous aneurysm of the renal pedicle following nephrectomy. EDWARD H. CAMP, M.D.

Local Heparin Treatment of Thrombosis following Arterial Resection. PENTTI HONKANEN. *Ann. chir. gyn. fenn.*, 1948, 37: 67.

Although heparin is generally considered to have no direct or indirect thrombolytic action, clinical experience (e.g., in thrombosis of the retinal vessels) has shown that small fairly fresh coagula may dissolve under heparin treatment. This fact was further confirmed by experimental studies of mechanically induced thromboses of the jugular vein in rabbits.

The author reports a case in which there was simultaneous perforation of the ileum and rupture of the left common femoral artery as the result of external trauma. The intestine was repaired and an attempt was made to reconstruct the injured artery, but a new thrombus immediately formed at the line of arterial suture.

Two and one-half cubic centimeters of heparin solution were injected directly into the thrombus, 0.5 c.c. was introduced into the external iliac artery, and 2.5 c.c. were given intravenously after the completion of the operation. No subsequent injections of heparin were given because of persistent hemorrhage from the operative wound. After 24 hours the heparin effect had to be inactivated by a protamine-sulfate injection and blood transfusion.

For the first 2 days after operation there was no pulsation in the femoral artery, but on the morning of the third postoperative day strong pulsation was palpated in the femoral artery peripheral to the injury as far as the two arteries of the dorsum of the foot. The occlusion had thus dissolved before 48 hours had elapsed after heparinization.

The thrombolysis is attributed chiefly to the endothrombic heparin since the freely circulating heparin was inactivated prior to the resolution of the thrombus. The author suggests that the lysis of large clots requires close contact of the heparin in high concentration with the thrombus. General heparinization fails to bring a sufficient concentration of the drug into contact with most of the clot, but intrathrombic injection seems to overcome that difficulty.

THEODORE B. MASSELL, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Cardiac Resuscitation. ROBERT D. DRIPPS, CHARLES K. KIRBY, JULIAN JOHNSON, and WILLIAM H. ERB. *Ann. Surg.*, 1948, 127: 592.

Sudden cessation of cardiac activity is an emergency, the recognition and treatment of which are poorly understood by many surgeons. Treatment must be boldly executed according to a carefully worked out plan consisting primarily of artificial respiration with 100 per cent oxygen and cardiac massage. The success or failure of such a program depends entirely on the length of time the brain is without blood supply. If restoration of the circulation occurs within 3 to 5 minutes, complete recovery can be expected, particularly in young, previously healthy individuals. Two problems demand attention: the heart must be restarted, and the central nervous system must not be deprived of oxygenated blood for more than from 3 to 4 minutes. Cerebral anemia of greater duration is followed by widespread cerebral cortical destruction and death. The course of 4 patients on whom cardiac resuscitation was successful is described. Two of these patients suffered cerebral anemia for a period longer than 3 to 4 minutes.

When no peripheral pulse is palpable and blood pressure cannot be obtained by auscultation, three possibilities must be considered: (1) the heart has stopped beating entirely, (2) the ventricles are fibrillating, or (3) cardiac contractions are so feeble that insufficient blood is ejected to raise arterial pressure to the level at which a peripheral pulse can be felt.

The method of artificial respiration depends upon the circumstances. If cardiac arrest has occurred in the operating room, an anesthesia machine is satisfactory. Manual compression of the breathing bag will inflate the lungs and the elastic recoil of the respiratory organs completes the cycle. Although respiration (normal or artificial) can cause some blood to circulate, the most effective mechanism for movement of blood is the pumping action of a contracting heart.

A transverse incision in the fourth left intercostal space is best. The fourth and fifth ribs can readily be spread apart and the heart is grasped by the operator. Exposure may be increased by dividing the fourth and fifth costal cartilages. A direct approach through the chest wall is superior to an abdominal incision with an attempt to reach the heart through either an intact or an incised diaphragm. Opening of the pericardium is not required. The heart is compressed firmly at the rate of 20 to 40 times per minute, depending upon the adequacy with which the ventricles fill between compressions. Each compression raises the arterial pressure 60 to 70 mm. Hg., and a pulse can often be felt in a peripheral vessel. To increase blood flow through the coronary arteries the aorta may be occasionally compressed just above these vessels. Secretions which accumulate in the pharynx and tracheobronchial tree must be aspirated. Prophylactic injections of penicillin are often advisable to minimize pulmonary infection. The patient must be turned frequently from side to side to avoid hypostatic congestion in the dependent portions of the lungs. Urinary output must be maintained by an adequate fluid intake, and constant attention must be paid to the bladder.

In general, if prompt diagnosis is followed by prompt therapy the heart can be started again. If, on the other hand, there is hesitancy rather than boldness, or if intravenous therapy is attempted before attention is directed towards the heart, the myocardium may have been sufficiently damaged by anoxia to resist all efforts at resuscitation. When the heart returns to a regular rhythm, and blood pressure is maintained, spontaneous respiratory activity can be expected to reappear within 5 to 30 minutes. C. FRED GOERINGER, M.D.

Skin Grafts. The "Spiral" Dressing. (Injertos de piel. El apósito espiroide). HÉCTOR MARINO. *Rev. As. méd. argent.*, 1947, 61: 463.

The author proposes a practical way of immobilizing skin grafts laid on conical surfaces, such as the segments of a limb, especially if different areas must be grafted in one sitting. In this particular instance a compressive dressing alone cannot be used before the end of the procedure. In addition, it might wrinkle or displace the graft if it is not applied with exacting technique.

The "spiral" dressing consists of a cellophane or cotton ribbon, or simply a No. 16 or 40 cotton thread, wound around the limb, inclosing the graft. Once the graft has been stretched on the raw surface, with or without suture of the borders, the ribbon is applied with utmost care and very slight traction by the surgeon himself. The turns are made at a distance of more or less than 5 mm. from each other and the graft thus remains attached to the surface under gentle pressure. Any excess of traction might bring circulatory troubles.

The ends can be knotted in a last circular turn or, still better, attached to the skin by a final stitch. The latter method avoids circular turns, which easily produce impairment of the surface circulation.

Covering the limb with a coat of adhesive (mastisol), before winding the cotton tape around it, helps to keep the turns in place.

It is important to remember that if an Esmarch bandage or the hemostatic cuff has been employed the restoration of the circulation is imperative before the spiral dressing is applied.

According to the author the spiral dressing has the following advantages over the plain or grease dressing:

1. It presents a quick and simple way of immobilizing grafts, allowing simultaneous operations on different sites of a limb.

2. As the graft remains perfectly attached, the number of sutures can be greatly reduced.

3. The graft can be observed until the operation is finished and the final dressing is applied.

4. The outer dressing can be removed without danger of pulling off the graft, which is caged under the ribbon turns.

5. Sutures can be removed and any sort of subcutaneous collections drained without disturbing the immobilization of the graft.

The use of the spiral dressing does not prevent correct postoperative immobilization with a compression bandage and, if necessary, a plaster cast. The author advocates the covering of the grafted area with sterile gauze, held in place with an elastic bandage, and enclosure with a plaster cast. The elastic bandage is covered with a layer of crepe paper to facilitate the later removal of the cast.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

The Preparation of Granulating Wounds for Grafting (a Method). JAMES T. MILLS, JOHN B. PATTERSON, and R. EUGENE HOUSE. *Plast. Reconstr. Surg.*, 1948, 3: 245.

A large majority of the patients with burns who come to the surgeon are the ones who have survived the acute phase and have been referred because of full thickness skin loss of varying extent. Most of the wounds are grossly infected and covered with exuberant granulations.

When a case of this type is admitted to the hospital the usually malodorous ointment dressing is removed with aseptic technique, a wound culture and photograph are taken, and laboratory work in the form of Kahn blood, plasma protein, and albumin and globulin tests, a complete blood count, urine analysis, and blood typing is ordered. All crusts and necrotic tissue are then removed, the surrounding skin is washed and shaved, following which a single layer of nonoverlapping, 40 by 44 mesh, plain sterile gauze is applied over the granulating surface. This is followed by wet saline dressings. Evaporation and capillary contamination are minimized by wrapping the part in sterile cellophane or similar moisture-proof material. The saline dressings are then changed every 4 hours down to the fine mesh gauze by the nursing staff with sterile technique. The fine mesh gauze is usually left undisturbed for a week unless necrotic tissue is present, in which event it is changed every 2 days until all separating tissue has been removed.

During the interval the patient's temperature usually returns to normal, his appetite improves, and the blood picture is brought back to near normal by blood transfusions. By the third hospital day the admission wound culture report is available and if this reveals pathogenic gram positive cocci, penicillin in the amount of from 5,000 to 15,000 units may be added to each ounce of saline solution used. If pathogenic gram negative bacilli are reported, from 0.1 to full strength soluble furacin solution may be used to advantage. However, neither is recommended for routine use since adequate drainage of the granulating wound will usually permit the tissues themselves to either destroy or effectively reduce the bacterial flora.

On the seventh hospital day the patient is taken to surgery, where, under general anesthesia, the fine mesh gauze is removed, a check culture is taken, all exuberant granulations are cut down to a firm base, fresh sterile fine mesh gauze is applied in a single layer, and the wet saline dressings every 4 hours are resumed. The check culture is usually either negative or the number of bacteria is appreciably reduced.

By the tenth hospital day the granulating bed is usually clean in appearance and ready for skin grafting. Under general anesthesia the recently applied fine mesh gauze is removed, the part covered with hot saline packs, and the grafts taken with a Padgett dermatome. These are then placed upon the granulating bed and fixed in position with sutures and a pressure dressing over fine mesh vaseline gauze. An attempt is made to cover the entire area in one operation if the wound is considered not too extensive, the skin is available, and the condition of the patient permits.

If, however, the area is too extensive, such as two entire lower extremities, one will be grafted and the other kept clean for covering at an early date. The intramuscular administration of penicillin in the amount of 50,000 units every 3 hours is started the day before surgery and continued until the first postoperative dressing on the third postoperative day. At the time of this dressing all sutures are removed, any blebs, pustules, or hematomas are incised or excised, and any necrotic graft or over-lapping graft edges are excised. Fine mesh gauze is again applied in a single layer and wet saline pressure dressings are instituted. These are changed down to the fine mesh gauze every 12 hours and continued for from 4 to 10 days as the case may warrant. All dressings can be discontinued by the tenth postoperative day if the "take is in the upper nineties." Any remaining granulating areas may then be strapped with adhesive tape until epithelization is complete. If the area grafted is a lower extremity an elastic bandage must be worn until the graft has adjusted itself to dependent circulation.

The cause of any appreciable loss of the graft will usually be found to be due to infection, hematomas, improper pressure, immobilization, or both of the latter, in that order.

The advantages of the fine mesh gauze treatment of granulating wounds are as follows:

1. A single nonoverlapping layer of fine mesh gauze allows the drainage of exudate through it into the overlying wet dressings, which in turn can be changed frequently and relatively painlessly.

2. Removal of the granulations prior to the day of skin grafting results in a cleaner wound and a more receptive bed, and minimizes bleeding beneath the graft.

3. Changing the fine mesh gauze 2 or 3 days prior to grafting likewise minimizes the oozing from the granulating wound when the gauze is removed on the day that the grafts are placed.

4. Following the skin grafting, the fine mesh gauze allows the spread of epithelium with a minimum of disturbance.

5. All dressings other than the initial one, those in which the fine mesh gauze is changed, and the initial dressing after skin grafting, can be done by trained hospital personnel.

FRANK F. KANTHAK, M.D.

ANESTHESIA

Animal Experiments with Procaine and Related Drugs. FREDERICK M. ALLEN and FRANK K. SAFFORD. *Current Res. Anesth.*, 1948, 27: 121.

These experiments deal with the clinical effects of the procaine class of drugs on animals, chiefly rats. They concern mainly the systemic effects of injections into the tissues and thus are somewhat intermediate between the clinical methods of local infiltration and intravenous anesthesia.

The approximate toxic or lethal dosage of procaine in rats was ascertained in intravenous, intraperitoneal, intramuscular and subcutaneous injections. Experiments were done to study the prevention of toxic or lethal effects by artificial slowing of the absorption. Epinephrine and local temperature reduction delayed absorption. The possible usefulness of colloid or lipoid emulsions is undetermined. The availability of the tourniquet adds to the safety of large procaine injections in the limbs. The higher the poisonous dose the greater must be the number of alternate applications and releases of the constriction.

The effects of procaine overdosage in animals are dyspnea, convulsions, and collapse, and the reaction to painful stimuli are exaggerated. Therefore, procaine alone is entirely unsuitable for systemic anesthesia in the common laboratory animals. It can reduce the dose and increase the efficiency of a barbiturate used for anesthesia, but the barbiturate must predominate and the procaine merely be a supplement. Analogues of procaine (intracaine, metycaine, pontocaine, nupercaine) were studied. They behaved similarly to procaine but were more toxic.

Sodium pentothal in 0.1 per cent concentration can be mixed with procaine without precipitation. The analogues of procaine are precipitated by pentothal in still weaker concentrations.

Pentothal sodium inhibited procaine convulsions in rats but did not counteract the lethal effects, nor was procaine an antidote to lethal doses of pentothal. Some protection seems to be offered by nupercaine.

Local tissue necrosis complicates the effects of procaine injections in rats. Procaine appears to neither mitigate nor aggravate secondary shock. There is evidence of great difference in the effects of procaine in animals and man. MARY KARP, M.D.

Regulation of Blood Pressure during Spinal Anesthesia: Observations on Intramuscular Pressure and Skin Temperature. H. MILWIDSKY and A. DE VRIES. *Anesthesiology*, 1948, 9: 258.

Among the theories advanced to explain the hypotension of spinal anesthesia, only two are supported by present-day investigators, i.e., the theory of stagnation in the postarteriolar bed and the theory of arteriolar dilatation. This investigation has been carried out to acquire further information on the mechanism of blood pressure regulation during spinal anesthesia in the light of these theories.

Intramuscular pressure in the lower and upper extremities of 11 patients under spinal anesthesia was measured to investigate the possible correlation between skeletal muscle tone and blood pressure fall during spinal anesthesia. No significant decrease of intramuscular pressure developed in the paralyzed lower extremities. Thus it was felt that a decreased skeletal muscle tone cannot be the main cause of blood pressure fall in spinal anesthesia.

Skin temperature measurements were performed in the lower and upper extremities of 21 patients under spinal anesthesia to ascertain the role of vasodilation in producing hypotension, and of compensatory vasoconstriction in preventing it during spinal anesthesia. The findings show a definite correlation between the degree of blood pressure drop and the upper level reached by the spinal anesthesia. The question why compensatory vasoconstriction occurs in some cases and not in others can now be answered.

Arteriolar dilatation resulting from vasoconstrictor paralysis in the anesthetized part of the body is the principal cause of blood pressure fall during spinal anesthesia. Compensatory vasoconstriction occurs in the area not under the effect of the anesthetic agent. The ratio between the area of vasodilatation and that of compensatory vasoconstriction determines the degree of blood pressure drop in spinal anesthesia. In high spinal anesthesia the majority of vasoconstrictor fibers, including those supplying the upper extremities (fourth to eighth thoracic) are blocked, and hypotension ensues. In low spinal anesthesia a sufficient number of vasoconstrictor fibers are left intact to prevent a major drop in blood pressure. MARY FRANCES POE, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Auriculomastoid Tube Pedicle for Otoplasty. DAN N. STEFFANOFF. *Plast. Reconstr. Surg.*, 1948, 3: 352.

Restoration of auricular deformities taxes the ingenuity of the plastic surgeon. The complex topography of the auricle calls for the solution of three problems, whether the reconstruction is to be partial or total. First, support must be supplied by autogenous or homogenous cartilage with duplication of near normal configuration. Second, soft tissue covering must be obtained, either from adjacent or distant

tissues. Third, immobilization of the reconstructed auricle to the side of the head at the correct angle must be attained. The pitfalls in solving these difficulties are discussed.

The report of a problem in partial reconstruction of the auricle in a patient with marked hypertrichiasis is presented. As the hypertrichiasis precluded the use of the usual donor sites for soft tissue coverage, resort was made to the skin of the medial surface of the remaining auricle, and the skin over the mastoid area was used to form a tubed pedicle flap, later to become the helix. Cartilage for support was implanted under a postauricular flap. Following this, the posterior surface of the postauricular flap was skin-grafted to form a normal auriculocephalic angle. The tubed pedicle flap was then utilized to form the helix.

Excellent photographs and diagrammatic sketches clearly indicate the various operative steps (eight) which were completed in 5 months.

EARL H. KLABUNDE, M.D.

Observations on an Absorbable Powder to Replace Talc. E. L. MACQUIDDY and J. P. TOLLMAN. *Surgery*, 1948, 23: 786.

The use of talc as a lubricant on gloves in surgery has been questioned for the past 10 years. Several authors have called attention to the dangers of talc as a factor in the production of adhesions and of talc granulomas. Difficulty has been encountered in finding an acceptable substitute for talc.

Talc or soapstone was found in the incinerated lung of a woman supposedly dying from tuberculosis, who had worked for some years in the handling of products made from soapstone.

Since 1919 there have appeared various articles describing a condition found particularly in the peritoneum, resembling tuberculosis, but which was recognized as not being a true tuberculous lesion. It was described as pseudotuberculosis.

Work has been done on absorbable starch powder. It consists of a mixture of amylose and amylopectins, derived from cornstarch, which has been treated by physical and chemical means to improve its lubricating value and to prevent gelatinization when autoclaved.

The first portion of investigation was an allergenic study to determine whether human beings could have become previously sensitized to this or similar starches. It was also attempted, by means of parenteral injections, to sensitize animals.

The second section of the study consisted of injecting starch powder intraperitoneally and subcutaneously in rabbits and guinea pigs, and intraperitoneally alone in dogs, to observe its effect. These particular experiments were also contrasted with similar experiments on animals, using talc. The talc experiments were carried out to confirm previously reported work on the use of this powder.

The third portion of the study consisted of inhalation experiments in which rabbits were exposed to atmospheres of talc and of starch powder under the same conditions.

Studies were made to determine existence of a previously acquired sensitivity to this starch. Patch tests were made on 50 adult males. The tests were applied and left in place for 72 hours with readings recorded at the end of 24, 48, and 72 hours. No positive reactions were obtained.

An extract was made of this starch in the manner used to prepare allergens for use in the allergy department. Eighty-one patients with allergenic backgrounds in the allergy clinic at the University of Nebraska were tested both by scratch and by intracutaneous tests. No reactions were found in this group. In so far as the results were concerned, no previous sensitivity to this starch could be found.

No sensitivity to this starch was found in the group of human beings tested.

There was nothing to prove that the animals became sensitive when injected parenterally with this absorbable powder.

No peritoneal adhesions occurred in any of the animals in which starch powder was used.

The work showed that a chemically modified starch powder, when placed in the tissue of animals, is nonirritating and is readily absorbed from the peritoneal cavity.

The work confirms that of previous authors that talc is irritating when placed in the peritoneal cavity of dogs and rabbits, and in the lungs of rabbits.

The evidence indicates that starch powder is a safe replacement for talc for surgical and other purposes for which this commodity is widely used.

HARRY W. FINK, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Cerebral Angiography. JOHN R. GREEN and ROMAN ARANA. *Am. J. Roentg.*, 1948, 59: 617.

The authors give a brief summary of the history of cerebral angiography and state that in America the method is used rarely for the diagnosis of cerebral neoplasms.

Angiographic anatomy. Two pairs of arterial trunks bring blood to the brain. The two carotid arteries and their branches supply the frontal, parietal, and lateral portion of the temporal lobes, the anterior half of the thalamus, and the corpus striatum. The two vertebral arteries and their branches supply the caudal region of the brain, including the inferior portions of the temporal lobes, occipital lobes, posterior part of the thalamus, brain stem and cerebellum. The distribution of the entire arterial system of the brain is described in great detail. Normal arteriograms, obtained by the carotid and vertebral injections, as well as diagrams are used for illustration.

The venous system of the brain is also considered. The venous channels are divided and considered as superficial cerebral veins, deep cerebral veins, and dural sinuses.

Circulation time. It takes approximately 4 seconds for the blood to pass from the carotid artery into the dural sinuses. The arterial phase lasts one second and the capillary phase is usually complete within 4 to 5 seconds after the injection of the opaque medium. By proper timing it is possible to visualize any of the phases roentgenographically. When the external carotid is visualized simultaneously and in injection of the vertebral system, the rate of flow is a few seconds slower. Likewise, increased intracranial pressure, certain neoplasms, aneurysms and vascular occlusions often slow down the circulation time.

Techniques. Cerebral angiography can be done by direct injection of the internal carotid or vertebral arteries, or by injection of their contributaries, namely, the common carotid and subclavian arteries, respectively.

During the past 5 years angiographic studies were made at the Illinois Neuropsychiatric Institute by over 10 different operators and teams. The percutaneous method of injection was preferred, this giving satisfactory information in 71 per cent of the cases. The authors believe that with experience a good operating team should attain close to a 100 per cent result. The cases in which the percutaneous method fails are subjected to surgical exposure of the artery. Sodium pentothal anesthesia by intravenous drip is used. Routine endotracheal intubation serves as a precaution against the possibility of laryngeal spasm during manipulation of the neck although it is not essential.

TABLE I.—CLINICAL ANALYSIS OF 107 ANGIOGRAPHIC EXAMINATIONS

	No. cases
1. Diseases of Blood Vessels	
a. Saccular arterial aneurysms	11
b. Malformations and tumors	
1. Arterial angiomas	2
2. Venous angioma (Sturge-Weber)	1
3. Lindau's disease	1
c. Occlusions	
1. Traumatic	1
2. Embolic	1
3. Eclamptic	1
Total	18
2. Neoplasms	
a. Meningiomas	7
b. Sarcoma of meninges	2
c. Gliomas	
1. Astrocytomas	4
2. Glioblastoma multiforme	28
3. Miscellaneous	
Subependymal plate	1
Third ventricle	1
d. Cancer metastases	7
e. Unverified tumors of the brain	8
Total	58
3. Miscellaneous Conditions	
a. Subdural hematoma	1
b. Brain abscess	1
c. Others	3
Total	5
4. Normal Angiograms	26

The authors give a detailed description of the injection technique as well as of the roentgenologic technique.

Contrast substances. The most commonly used opaque media for cerebral angiography are: (1) thorotrast, (2) diodrast, (3) perabrodil, and (4) ethyl triiodine stearate. The relative merits of each is discussed. Only the first two substances are being used in American clinics. The authors prefer diodrast since, in contradistinction to thorotrast, it is completely excreted and has no potential danger from radioactivity. Allergic reactions may occur with it but a preliminary sublingual test applied routinely would put one on guard. The injection of the diodrast is painful and therefore a general anesthesia is required.

Material. The authors publish their observations on 107 cases of cerebral angiography. There was not a single mortality and a transient allergic reaction was noted in only 6 instances. The distribution of the cases is shown in Table 1.

1. *Diseases of blood vessels.* Cerebral angiography offers a most specific method of diagnosis in this group of entities. In the authors' series saccular aneurysms comprised the majority of the vascular

anomalies. They usually were (1) congenital, (2) arteriosclerotic, and (3) mycotic in origin. In most cases, it was possible to visualize the exact site, size, and anatomic relationship of the aneurysms. This knowledge is of invaluable aid to the operator in planning whether to merely ligate the internal carotid artery in the neck or to resort to an intracranial intervention. It must be pointed out that in some instances, although the clinical diagnosis of aneurysm seemed to be certain, the angiogram remained negative. This can happen when the neck of the aneurysm is too small to receive the contrast substance or if the aneurysm is filled with hematoma. In such cases the neurosurgeon must proceed without the aid of angiography.

2. *Neoplasms.* The most important angiographic alterations in neoplasms are: (1) displacement of normal vessels, (2) pathological changes within the blood vessels of certain tumors, and (3) dilatation of vessels supplying a tumor, i.e., meningiomas. Therefore angiography offers, in addition to the exact localization of the neoplasm, the possibility of a histopathologic evaluation of the type of tumor.

The authors' series includes 58 cases with neoplasms. In the majority, there was evidence of increased intracranial pressure at the time of examination. Angiography did not lead to aggravation of the symptoms or signs in a single case, so that the method is less dangerous than ventriculography.

The angiographic pattern is discussed in detail for (1) meningiomas; (2) gliomas, comprising the two important subgroups of (a) glioblastoma multiforme, and (b) astrocytoma; and (3) cancer metastases. The glioblastoma multiforme was diagnosed in 22 out of 28 verified cases, and the cancer metastases in 5 out of 7 verified cases.

Indications and contraindications. Angiography is contraindicated in acute cerebrovascular hemorrhages, thromboses, or emboli, and is hazardous in old patients with cardiac decompensation, hypertension, and advanced atherosclerosis. In suspected brain abscess and chronic subdural hematoma it should be used only after other diagnostic methods have failed.

Air studies are preferred for the localization of obscure lesions of the ventricular system, of the posterior fossa, and those above the tentorium in which lateralizing signs are absent. On the other hand, angiography is the method of choice in aneurysms, vascular malformations, parasellar lesions, and in supratentorial pathology if lateralizing findings are present.

The authors give the case histories of 15 patients and use the respective roentgenograms for illustration. A bibliography of 60 articles is appended.

T. LEUCUTIA, M.D.

Plain Radiography of the Skull in the Diagnosis of Intracranial Tumors. DAVID STENHOUSE. *Brit. J. Radiol.*, 1948, 21: 287.

The author presents an analysis of the pertinent radiological findings in plain films of the skull in 200 verified cases of intracranial tumor at the Killearn Hospital, Stirlingshire, Scotland. In 22 per cent of the cases radiographic signs of increased intracranial tension were indicated by diastasis of sutures, increased convolutional markings, or thinning or erosion of the dorsum sellae. Increased convolutional markings were accepted as of significance but only with caution; the group included only 4 cases—3 children who also showed diastasis of sutures, and 1 adult with a cerebellar astrocytoma in whom the calvarium had a distinct beaten silver appearance. Localizing signs were found in 30 per cent of the patients in the form of shift of the calcified pineal, abnormal intracranial calcification, bone erosion, new bone formation, and occasional spectacular widening of vascular channels so pronounced as to fall outside the limit of normal variation. While such signs were indicative of lesion, it was of course recognized that they were not in themselves pathognomonic of tumor.

Sellar changes were found of value in localization only if in the form of uniform expansion of the sella. The most frequent sellar changes were thinning or erosion of the dorsum, but these were common both to tumors in or near the sella and to those at a distance from it (metasellar lesions). The degree of sellar destruction and the degree of hydrocephalus were found roughly proportional to each other in metasellar lesions, but there was no satisfactory evidence that the hydrocephalus itself was the cause of the bone destruction. The possibility is offered that at least a contributory cause of such sellar changes may be the finding, in some cases, of dilated anterior end of the third ventricle in contact with the sella.

Abnormal intracranial calcifications (and ossifications) were, of course, of definite help in localization and occurred in 7 per cent of the cases, composing a group of meningiomas, astrocytomas, suprasellar cysts, an oligodendroglioma, a dermoid and a hemangioma, and including 4 osteomas. The attachment of the latter to the base of the skull and their homogeneous and very marked density with lobulated periphery made them recognizable radiographically as osteomas, and the dermoid could also be diagnosed from the roentgenogram because a tooth was visualized. Otherwise the author found the position and pattern of solitary intracranial calcification not dependable as an indication of the pathological nature of the lesion—not even as to whether it was a tumor. All 3 instances of suprasellar calcification in this group occurred in craniopharyngiomas, but on reviewing the literature the author found that Dale in 1934 had reported suprasellar calcification in a chiasmal glioma and in a suprasellar meningioma.

Shift of the calcified pineal laterally or in the sagittal plane may be a valuable sign in localization. In this series 32 calcified pineals were visible in anteroposterior projection, and of these 13 showed a lateral shift. In each case the tumor was found to lie in the hemisphere opposite to the direction of shift. No shift is to be expected in cases of tumor situated in the posterior fossa, in very small cerebral tumors, in

multiple tumors evenly divided in mass between the cerebral hemispheres, or in small supratentorial midline tumors. Shift of the calcified pineal in the sagittal plane was shown in 15 cases. All were supratentorial, and in each the shift was away from the tumor. Of these, in 5 cases a lateral shift was also shown, so that not only could it be told which hemisphere was involved but roughly which half of it.

Extracerebral tumors have a common capacity subject to radiographic record, that of bone erosion. Among such tumors in this study were those of the pituitary, a chordoma, some acoustic neurinomas, and several meningiomas, especially those of the base. New bone formation, on the other hand, was stimulated only by 2 meningiomas located near the midline of the vault, and although rather characteristic in appearance, was known to have been imitated by lesions of other origin such as osteoplastic metastases, primary sarcoma, hemangioma, and osteitis fibrosa. LILIAN DONALDSON, M.D.

Radiology in Heart Surgery. T. HOLMES SELLORS. *Brit. J. Radiol.*, 1948, 21: 226.

The author, a thoracic surgeon, emphasizes the importance of accurate diagnosis in the advancement of cardiac surgery, and the need for teamwork between the physician, the radiologist, and the surgeon. He believes that comprehensive roentgen examination not only in the standard positions should be carried out, but that careful fluoroscopy, kymography, and angiocardiography are important.

Two main groups of heart disease of primary interest to the surgeon are discussed: (1) certain forms of congenital disease such as patent ductus arteriosus, coarctation of the aorta, anomalies of the aortic arch and great vessels, and Fallot's tetrology, and (2) cardiac compression causing pericardial abnormalities, pericardial effusions, polyserositis, and constrictive pericarditis.

The author presents briefly the surgical possibilities and the differential diagnostic criteria in these conditions, with emphasis on the roentgenological aspects.

The article is accompanied by good reproductions of representative diagnostic films with several kymographs. ALLAN K. BRINEY, M.D.

A Simplified Method of Roentgen Pelvicephalometry. ANGUS K. WILSON. *Am. J. Roentg.*, 1948, 59: 688.

Accurate roentgen measurements of the fetal skull is difficult. For the past 4 years the author has employed a method which permits accurate cephalometry in both vertex and breech presentations. The author reports his experience with the use of this method.

Since, in the majority of cases, the fetal skull lies in the maternal midline and in a reasonably sagittal or lateral plane, it is possible to determine the height of the skull above the film and to make corrections for distortion due to magnification, thus actually calculating the desired skull dimensions. An anteroposterior and a lateral view (at right angles to each other) is used with the patient recumbent. Knowing the target film distance and the distance from the midline of the patient to the film, the height of the fetal skull above the anteroposterior view and one or more of its diameters, as well as the heights of the maternal pelvic planes can be calculated.

In the case of vertex presentation, four films are made. If there is a breech presentation one or two more films, centered on the fetal skull, are added. The films are (1) a film in a semi-erect view with the patient sitting at an angle of 45 to 55 degrees and the tube centered opposite the anterior superior iliac spine to show the pelvic shape; (2) a standard anteroposterior film to which, in case of breech presentation, a second 10 by 12 inch film is added, centered over the skull at the higher level; (3) a lateral film made immediately after the former so as not to disturb the relative positions, with the patient moved to the side of the table directly against the cassette and the tube turned horizontally, supplemented by a second film if there is a breech presentation; and (4) another lateral film made with the patient erect in a true lateral view so that the femoral heads are superimposed, the tube being centered as in film 3, midway between the symphysis pubis and the anterior superior spine of the ilium.

The distance from the target to the film is 40 inches. Film 3 serves to determine the heights of the fetal skull and pelvic planes. When making this film the technician also measures the distance from the midline of the patient to the surface of the wafer grid, adding 1 cm., which is the distance from the surface of the grid to the film within the cassette. When film 4 is made, the distance from the patient's midline to the table top is measured, and to it 4.0 cm. are added, corresponding to the distance from the surface of the table to the film within the cassette in the Bucky tray.

The positioning of the patient for all four films is illustrated and the resulting roentgenograms are reproduced.

The calculations are based on the following mathematical formula:

$$\frac{\text{Tube to film distance}}{\text{(Tube to film distance)}-\text{(Object to film distance)}} = \frac{\text{roentgen image diameter}}{\text{original diameter}}$$

For convenience, the author constructed a false centimeter scale based on the 40 inch target film distance which is similar to that developed by Walton, based on a 30 inch distance. The scale is reproduced and its use explained. As has been stated, film 1 serves only to ascertain the pelvic shape. The measurements are made, in respective order, on films 3, 2, and 4. The calculations and necessary corrections are described in detail.

The method has the advantage of technical simplicity with ease of calculation and evaluation of the results. The only measurements required of the technician are from the midline of the patient to

fixed surfaces. The calculations can be made on wet films if need be.

This report is based on an experience gained in over 200 examinations. T. LEUCUTIA, M.D.

On Irradiation Sickness. KAI SETÄLÄ and PENTTI ERMALA. *Ann. chir. gyn. fenn.*, 1948, 37: Supp. 1.

During the past decade irradiation sickness has become a problem of considerable magnitude. It is impossible to predict who will develop radiation sickness. It may appear after the administration of 200, 600, or 1,000 roentgens. Symptoms, although variable, are manifested by nausea, lassitude, anorexia, vomiting, oliguria, cramps, bloody diarrhea, low blood pressure, restlessness, and prostration.

Several theories have been offered as a cause of irradiation sickness: gases produced in the x-ray room; the electric field surrounding the patient; vitamin B deficiency; irradiation effects of endocrine glands; destruction of intestinal mucosa; nervous factors; "h" (histaminelike) substance; and changes in the blood cholesterol contents. Of all the theories mentioned, the only ones that are still supported by some authorities are the histaminelike substance and changes in blood cholesterol.

The effect of 300 roentgen irradiation on lipids showed a 60 per cent decrease in blood cholesterol and an increase of 28 per cent of the liver cholesterol. The effect was more pronounced when the dosage was raised from 300 to 1,000 roentgens.

A group of 65 adult patients was used in the present study. A determination of the chylomicron count, which is more rapid and reliable than the usual methods of chemical analysis, was made. Chylomicron is formed of lipids and is surrounded by a protective protein layer; the average size is 0.5 to 1.0 u and there are 80,000,000 chylomicrons per cubic centimeter of blood.

All forms of roentgen therapy were used, the dosage varying from 260 roentgens for cancer of the larynx to 350 roentgens for gynecological cancer. A 5 gm. radium pack was used to give a 732 roentgen surface dose.

All parts of the body and different types of carcinoma were studied for the chylomicron count. Of 11 patients with head lesions treated, only 2 showed evidence of irradiation sickness; in these 2 patients the carotid sinus area was irradiated. Of 16 patients with neck lesions, the carotid area was irradiated in 15 patients; of these, 9 developed irradiation sickness. The chylomicron curves in all cases were depressed. Of 3 patients with lesions of the thorax and 2 with lesions of the extremities, none developed irradiation sickness. Of 23 patients with carcinoma of the abdomen, 5 showed evidence of irradiation sickness with typical lowering of chylomicron count. It was also noted that in some instances of prolonged irradiation, the chylomicron count would tend to become lower even if the patient showed no clinical evidence of irradiation sickness. Not once was a low chylomicron count observed in a well patient.

On the basis of their studies, the authors conclude that patients suffering from irradiation sickness show marked changes in the chylomicrograph. Irradiation to the lower cervical region (carotid sinus), midabdomen, or pelvis produced evidence of sickness.

A daily dose exceeding 350 roentgens, if treatment were continued, would produce sickness; also, an increase in the daily dose, or a larger dose, would show the same results. In some instances changes in the chylomicrograph were evident before the clinical symptoms.

Facts tend to support the theory that irradiation produces injurious effects which are carried from the tissue by way of the circulation. This substance is histaminelike in character. In addition, involvement of the sympathetic and parasympathetic nervous system which controls the chemical composition of the blood may be a factor.

MAURICE D. SACHS, M.D.

A New Medication for Radiation Sickness (Une nouvelle médication du mal des rayons). H. KRITTER. *Presse med.*, 1948, 56: 370.

Radiation sickness with its well known symptoms, such as loss of appetite, fatigue, nausea, and vomiting, is a relatively frequent complication of roentgentherapy, occurring particularly in patients treated for pelvic or thoracic affections. Different factors have been incriminated in explaining the cause of the symptoms: the presence of ozone in the treatment room, chemical changes in the organism, absorption of substances produced by the destruction of cells, particularly histamine, sympathetic or parasympathetic disequilibrium, injury of the suprarenal glands, and psychologic factors. None of these theories has given a satisfactory explanation.

Stig Kulander, after having analyzed the degree of acidity of the vomitus of 54 patients suffering from radiation sickness, found total achlorhydria in 50 and a very low degree of acidity in the 4 others. He then gave these patients a 7 per cent solution of hydrochloric acid; immediately after, the symptoms subsided and disappeared in the majority of cases.

The author states that he had occasion to treat 20 patients with hydrochloric acid. These patients had been treated for uterine tumor and presented a variable degree of radiation sickness. Forty-eight hours after the hydrochloric acid was given, the vomiting stopped, the nausea was attenuated, and the appetite became normal. In some cases, a state of nausea persisted but it was not serious enough to prevent the patient from eating.

The dose prescribed is as follows: 7 per cent officinal hydrochloric acid, from 20 to 40 drops in water before the principal meals. In certain cases with severe alimentary intolerance, it is advisable to prescribe a supplementary dose of 40 drops immediately before the treatment.

In mild cases, with only nausea but no vomiting, adrenaline, vitamin P.P., and parasympathicomimetics are often sufficient for attenuating the symp-

toms. However, in severe cases with digestive intolerance and dehydration and in which discontinuation of the treatment is considered, it seems that hydrochloric acid by mouth gives more effective results than any other ordinary medication used up to the present time. MARC K. P. SIU, M.D.

MISCELLANEOUS

The Effect of Radiation on Hemopoiesis. Is There an Indirect Effect? JOHN S. LAWRENCE, WILLIAM N. VALENTINE, and ANDREW H. DOWDY. *Blood*, 1948, 3: 593.

The controversial and poorly understood problem of the presence or absence of an "indirect" action of roentgen rays is again investigated. This relates especially to tissues that are far removed from the site of the irradiated ones. In a review of the literature upon the subject, the authors cite much evidence for and against such an effect, and conclude that "it is readily apparent that the literature weighs heavily on neither side of the question."

Twenty-six successful cross circulation experiments, using cats, are presented. Normal animals were connected to irradiated animals in two groups: (1) shielded groups of animals whose partners were connected at the time of irradiation, and (2) those whose partners were cross circulated with a previously irradiated animal. The cross circulation required from 3 to 10 hours, lasting 8 hours in the largest group. The total leucocyte and absolute lymphocyte counts were followed for 28 days.

The authors were unable to demonstrate any specific effect due to the radiation alone. They offer three possible explanations for the differences of opinion expressed by others. First, the indirect action may be due to the inclusion of larger amounts of hematopoietic tissue than those generally considered. This may be especially true in debilitated patients who have lost some of the ability to supply additional reserve cells; also, the exact amount of tissue irradiated is not known in many cases. Second, a specific indirect effect may still exist, even though these experiments do not support such a contention. Third, a nonspecific effect of the radiation may occur because of injury to tissue irradiated with the liberation of a circulating toxic substance. The substantial reduction in lymphoid tissue not directly injured has been well substantiated and frequently observed as a response to a variety of injurious agents. This is well shown by striking degenerative and involutionary changes in all lymphatic organs as a response to a variety of insults, as described by Selye, and called the "alarm reaction" by him. Such insults include cold, heat, surgical shock, and drugs. Radiation's indirect action may be another insult of this nature. ROY GREENING, M.D.

Some Hematologic Effects of Irradiation. WILLIAM BLOOM and LEON O. JACOBSON. *Blood*, 1948, 3: 586.

Two main types of study were carried out: (1) total body irradiation and (2) focal irradiation.

In the first case rabbits, mice, rats, and guinea pigs were exposed to total body irradiation with roentgen rays and gamma rays, and slow and fast neutrons. The LD 50/30 days' dose of each agent was used and gradually decreased until no histologic or hematologic changes were observed.

Focal irradiation was administered to a few mice through external sources, using P_{32}, but largely through intravenous,intraperitoneal or intramuscular injection and inhalation of P_{32} and several other isotopes, including both alpha and gamma emitters. The LD 50/30 days' dose and diminishing fractions thereof were used.

In addition, daily exposure with gamma and roentgen rays over periods up to 3 years was carried out.

The authors observed no evidence in the blood-forming tissues and in the peripheral blood of a primary stimulation of hematopoiesis. An increase in "circulating-heterophil-leukocytes" occurred within 24 hours with doses up to and beyond LD 50/30 days of total body irradiation, an observation previously reported by other investigators. The authors attribute this to a reaction to injury mediated through a mobilization rather than to the formation of new blood cells.

The changes noted on histologic examination were the same, regardless of the type of irradiation used.

The spleens in the mice exposed to large amounts of beta rays in the focal irradiation experiments showed zones of radiation damage merging gradually with normal spleen. There was no zone of hyperplasia of undamaged cells at the periphery of the zone of radiation damage. Since beta rays have a limited range of penetration, the authors point out that near the periphery of the range the small amount of radiation would evoke a stimulation if such an effect occurred.

In the authors' experience, external and internal ionizing radiation failed to produce evidence of primary stimulation in the blood-forming tissues and peripheral blood. PAUL R. NOBLE, M.D.

The Value of Platelet Counts in Radiotherapy. W. M. COURT BROWN. *Brit. J. Radiol.*, 1948, 21:221.

The increasing use of wide-field roentgen therapy necessitates a more reliable indicator of the constitutional effects resulting from excessive irradiation of the bone marrow.

Red and white cell counts have previously been used as indicators during treatment, but in spite of these controls some patients have suffered from a temporary or permanent marrow failure at a later date.

Noting that skin hemorrhages similar to thrombocytopenic purpura often appeared just before severe anemia in cases of wide-field irradiation, the author investigated the effect of radiation on the platelet count as an indicator.

It was found that wide-field radiation produces a fall in the blood platelet level which may be paralleled by the white cell count, but not always so. In

many cases, the white cell count after an initial fall shows a tendency to rise, and this rise may be maintained in spite of the continuance of treatment, being most marked in the leucemias. With more restricted forms of radiation in which a high local dose was given over bone, similar platelet count drops were observed.

Following irradiation platelet counts continue to fall for a variable period, returning to normal within 1 month if the level at cessation of treatment was above 100,000 platelets per cubic millimeter.

In a series of over 100 cases it has been found that with the use of 200,000 platelets per cubic millimeter as the low limit of normal, and 100,000 platelets per cubic millimeter as the lower limit of safety, constitutional effects from excessive irradiation of the hemopoietic system have been completely avoided, and that adequate dosage has been administered.

Wide-field irradiation is not given to any patient with an initial platelet count below 100,000 per cubic millimeter, and treatment is terminated when this level is reached.

Although textbooks state a platelet level below 40,000 per cubic millimeter is usually associated with purpuric manifestations, levels of roentgen ray-induced thrombocytopenia of the order of 15,000 to 20,000 platelets per cubic millimeter have been observed without petechial hemorrhages. In those cases with petechiae the time interval over which the petechiae appeared was very much shorter than the time interval over which the platelet level remained critically depressed. Some other factor besides thrombocytopenia is postulated for the production of petechial hemorrhages, and several theories are advanced. The possible effects of roentgen irradiation on the prothrombin level are now being investigated.

ALLAN K. BRINEY, M.D.

Complementary Postoperative Radiotherapy for Breast Cancer (Radioterapia post-operatoria complementare del cancro della mammella). GIANCARLO PERLASCA. *Tumori*, Milano, 1947, 33: 213.

The value of postoperative roentgentherapy has always been in doubt; therefore the author made a study of the results obtained in the patients undergoing surgery alone and compared them with those obtained in patients undergoing surgery followed by irradiation.

The patients with carcinoma of the breast were classified according to the method advocated by Steinthal. Those in the first stage had a small, isolated, movable tumor, with no palpable glands and no metastases. Those in the second stage had a larger tumor with attachment to the skin and the pectoral muscle, palpable lymph glands, and metastases to these glands (verified by microscopic examination). Those in the third stage presented clinical metastases with involvement of the supraclavicular glands.

The percentage of cure of patients with breast tumors in the first stage after 3 or 4 years was the same, whether or not they had received postoperative radiotherapy.

For those in the second stage, nothing was more helpful than removal followed by radiotherapy to get rid of the residual neoplastic tissue. One must not forget that x-ray therapy is local and there are times when diffusion has already taken place and any spread is not affected by roentgen therapy. This explains the fact why some people die of metastases although the local lesion has been destroyed.

For patients in the third stage, the use of postoperative roentgen therapy is only palliative as it only decreases pain and prolongs life.

ARTHUR F. CIPOLLA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Vitamin C Requirement of Human Adults: Experimental Study of Vitamin C Deprivation in Man. R. A. PETERS, K. H. COWARD, H. A. KREBS, L. W. MAPSON, and OTHERS. *Lancet*, Lond., 1948, 1: 853.

There is no agreement on the requirement of vitamin C in man. All are rough estimates and range from 30 mgm. or less to 75 mgm.

This paper attempts to assess the daily requirements in human volunteers. There were 19 men and 1 woman between the ages of 21 to 34 years. They lived a normal life without strenuous physical work. Scurvy developed in all on the deprivation diet after 35 weeks, apparent by the numerous hemorrhagic follicles on the legs, by the gum changes, by the redness and lividness of the scars, and by the reduced tendency of the recent scars of incision to heal. Other tests revealed no significant findings.

The response to 10 mgm. doses of vitamin C daily followed a general pattern. Hemorrhages ceased within a month; wound tissues healed within 2 months, but the gums required from 10 to 14 weeks for complete healing. The concentration of vitamin C in the plasma and white blood cells showed a small but distinct rise after 101 days.

Judged by the criteria available, a dose of 10 mgm. of vitamin C daily was sufficient to maintain the normal healing power of the skin up to 11 months. In the nonsupplemented group severe defects in wound healing occurred similar to those recorded in scorbutic guinea pigs. These defects were encountered only when and not before clinical signs of scurvy had appeared. STEPHEN A. ZIEMAN, M.D.

Thrombin and Delayed Thrombin, Modifiers of the Coagulation Time (La thrombine et la thrombine-retard, modificateurs du temps de congulation). MICHEL DECHAUME, GEORGES CRUT, and MICHEL GOUDAERT. *Presse méd.*, 1948, 56: 317.

The parenteral use of thrombin appears to be at least as important as its local application. It increases greatly the hemostatic capacities of the patient. Intravenous injections of 75 units of thrombin mixed with glycocol, which acts as a buffer substance, are well tolerated; they decrease the coagulation time in direct ratio to its original state. This mixture is called medical thrombin. The addition of a 5 per cent solution of magnesium hyposulfite to the medical thrombin reinforces its efficacy and makes its action less rapid but more prolonged; the reaction is such as to justify the term "delayed thrombin."

The authors have used intravenous injections of thrombin to prepare a hemophilic patient for dental extractions. They observed the following facts.

1. Two hours after an injection of medical thrombin the coagulation time fell from 360 minutes to 20 minutes.

2. The coagulation time then rose slowly but did not reach its original state 24 hours after the injection.

3. It was possible to lower the coagulation time by giving daily injections.

4. By adding a 5 per cent solution of magnesium hyposulfite to the medical thrombin any danger of coagulation in the syringe was avoided and the risk of sending an embolus into the general circulation was eliminated.

5. This combination of drugs did not reach its maximal effect before 8 hours had elapsed since the injection.

6. With this delayed thrombin the average coagulation time was less than that obtained with 7 times more medical thrombin. These facts were confirmed by observations in 2 other patients whose coagulation time was 25 and 30 minutes, respectively.

The authors have injected up to 300 units of medical thrombin in a day and believe that the intravenous administrations should be reserved for severe cases. In average cases 150 units may be given orally on the eve and on the morning of the intervention; in more serious cases intramuscular injections may be used.

Medical thrombin, which acts quickly, should be regarded as an emergency therapeutic measure capable of arresting the hemorrhagic accidents of any subject whose blood coagulates poorly. Delayed thrombin seems to get quite near to the ideal treatment of hemophilia. It is not yet what insulin is to diabetes, but judging from the results obtained it is well on the way to becoming just as efficient.

RICHARD KEMEL, M.D.

Pathologic Studies in Secondary Shock (Pathologisch-anatomische Untersuchungen uber den Wundschock). LAURI KALAGA. *Acta Soc. med. Duodecim*, 1947, 24: 30.

The author refers to the paucity of reports of histological studies in secondary shock. It is true that there have been extensive studies in animals subjected to experimental shock, but these do not necessarily reflect the changes seen in human beings. The author was unable to find complete studies with careful histological analysis of any large series of patients who had succumbed to shock. With the casualties attending war and the large number of high speed traffic accidents, the author undertook such a study in a series of 9 patients who had died, presumably of shock. These patients had died at varying periods, from 5.5 hours to 4 days, following the trauma. The autopsies were performed very soon after death, and all of the parenchymatous organs, the hollow viscera, and the skin, subcutaneous tissue, and muscles, were subjected to careful gross and histologic scrutiny.

Definite changes were found in all of the cases in the liver, cardiac musculature, kidneys, adrenal glands, and possibly in the spleen. The liver showed the most severe changes, which were observed as early as 5.5 hours following the injury. The author terms them as irreversible changes. They consisted of spotty areas of necrosis which started at the center of the liver lobule. These proceeded outward, diminishing in intensity. There was much edema of the tissues with separation and degeneration of the liver cells. The blood sinuses were distended with blood, and their walls thickened and edematous. If death was delayed the number of these necrotic areas was increased, although the individual necrotic areas were not increased in size.

The changes in the heart muscle were similar to those of the liver although they were not as widely distributed. As early as 5.5 hours after the injury small areas of capillary stasis were observed. Degenerative changes in the muscle fibers occurred soon after. Areas of miliary necrosis were seen in increasing numbers when death was delayed, with much hyperemia of the interstitial tissue. The changes in the kidney were identical with those of the liver and the heart muscle, except that they were later in appearance. The convoluted tubules seemed to contain red blood cells, and the glomeruli were congested.

The changes in the adrenal glands were progressive, making their appearance, at the earliest, from 16 to 20 hours after the injury. The lipoid content of the cells of the cortex then seemed to disappear, but if death did not occur for 3 or 4 days, the lipoid was completely absent. The change in the spleen was simply an apparently larger content of blood than is normally observed in this organ.

From these findings the author concludes that the changes he has seen differ from those observed when shock is caused by the use of a toxic agent, and that if there is a loss of blood serum, it is selective in certain organs and not a diffuse reaction.

WILLIAM C. BECK, M.D.

Kidney Complications during Sulfonamide Therapy. A. HARRESTRUP ANDERSEN and IB. ANDERSEN. *Acta med. scand.*, 1948, 130: 259.

The authors report 11 cases of anuria resulting from sulfonamide therapy during an 18 month period at Bispebjerg Hospital, Copenhagen, Denmark. The report lists the 8 cases of sulfonamide anuria previously described by other Danish workers and cites the relative incidence of this complication in several large series of sulfonamide treated patients reported from Scandinavian and American clinics. The lowest incidence, 2 per cent, was found in the largest and most recent series quoted, the 1,936 patients reported by Vilter and Blankenhorn in 1944 from the Cincinnati General Hospital.

The types of kidney damage resulting from sulfonamide therapy are classified as mechanical extrarenal, mechanical intrarenal, and toxic intrarenal. The mechanical extrarenal is the most common and least dangerous. It results from deposition of sulfonamide crystals in the kidney pelves, ureters, and bladder. The mechanical intrarenal type of damage is less common and more lethal. It results from a similar deposition of crystals in the uriniferous tubules, usually the collecting tubules but sometimes also the convoluted tubules. The toxic intrarenal damage is the rarest and most serious of the three types. It does not result from the deposition of crystals but rather from a toxic degeneration of the convoluted tubules, likened by some investigators to the picture of "crush syndrome," and said to be consequent to the cortical ischemia which the organism imposes upon the kidney in an attempt to prevent toxic substances from reaching the cortex.

Detailed case reports are given of the authors' material. Of 11 cases of anuria, 7 were considered the result of mechanical extrarenal damage. There was no fatality in this group. One patient who had mechanical intrarenal damage died. The 2 instances of toxic intrarenal damage occurred in the same individual, with 6 months intervening between the episodes. The second attack proved fatal. There was another fatal case, in which the mechanism was felt to be toxic intrarenal damage, although the evidence was not entirely conclusive.

In the discussion it is brought out that the offending drug was almost exclusively sulfathiazole, although in the 3 cases of toxic intrarenal damage, "lucosil" had also been administered. The dosage given was not great, averaging 21 grams. The interval between institution of sulfonamide therapy and appearance of symptoms varied from 1 to 5 days. In discussing the prophylaxis of sulfonamide anuria the authors stress the importance of adequate urinary output, preferably up to 1,500 c.c. in 24 hours. Although routine alkalinization of the urine is practiced by many men, it has at least one disadvantage, namely, that alkalies suppress the reabsorption of sulfonamides in the tubules and may thereby tend to increase precipitation of crystals in the urine. The choice of a relatively soluble sulfa compound will minimize the danger of crystal formation, but even the less soluble compounds can be used effectively in combination with other forms of sulfonamides. Hagerman has shown that a mixture of different sulfonamides can be present in a solution without having the compounds mutually reduce each other's solubility.

The treatment advocated for mechanical extrarenal anuria is ureteral catheterization with removal of crystals and irrigation with isotonic sodium bicarbonate solution, combined with parenteral bicarbonate administration. The treatment of mechanical intrarenal and toxic intrarenal anuria is not nearly so simple. The authors advocate judicious administration of parenteral fluids, particularly sodium bicarbonate, and they list other therapeutic attacks: lumbar sympathetic block, intravenous procaine administration, decapsulation of the kidney, and perfusion of the peritoneal cavity.

BENJAMIN F. LOUNSBURY, M.D.

The Parathyroid: a Study Based, in Part, on 60 Postmortem Examinations with Presentation of a Case of Hyperfunctioning Adenoma. HACK U. STEPHENSON, JR., WILLIAM L. MCNAMARA, and BURRILL GOLDBERG. *Am. J. M. Sc.*, 1948, 215: 381.

All of our knowledge of the parathyroid is relatively recent, since that organ was first recognized as an independent structure in 1880 and since it was not until 1902 that the first case of parathyroid tumor was reported. In this article the authors review the history of the diseases of this important gland and discuss its embryology, anatomy, histology, and pathological physiology. In connection with the histology, material is presented from the studies of 60 postmortem specimens.

The hormone secreted by the parathyroid glands acts largely upon calcium and phosphorus metabolism, apparently regulating the level of calcium ions in the blood. Hyperfunction produces typical disturbances, most notable in the bones. There is some disagreement as to the manner in which these changes are effected. Collip and others believe that the hormone acts specifically on bone, causing proliferation of osteoclasts and in turn resorption of bone and possibly formation of giant cell tumors. Excessive quantities of calcium and phosphorus are freed from the skeleton and carried in the blood to the kidneys and intestine. The resulting hypercalcemia and increased urinary calcium and phosphorus are logical consequences, but the diminution of the inorganic phosphorus content of the blood is not clearly understood. On the other hand, Allbright contends that excessive parathyroid hormone acts primarily on phosphate metabolism, lowering the renal threshold for phosphorus and increasing thereby the amount excreted in the urine. There is a consequent decrease of phosphate ions in the serum, resulting in unsaturation of the blood with calcium phosphate and leading ultimately to liberation of the calcium phosphate of the bones. Such a view, not completely confirmed by all investigations, would make the parathyroid influence on calcium metabolism and on bone secondary to its regulation of phosphorus metabolism.

The diseases of the parathyroid are classified as primary states, secondary states, and neoplasms. Of the primary states it may be said that diffuse hyperplasia with hyperfunction is very rare; so too is atrophy of the gland with hypofunction. In secondary parathyroid disorders there may be hyperfunction of the gland as a compensatory reaction to those conditions in which chronic renal insufficiency exists, with phosphate retention and chronic acidosis. There may be similar secondary hyperparathyroidism in diseases which deplete the available body calcium, such as rickets or multiple myeloma. Secondary hypofunction, sometimes accompanied by tetany, occurs following extensive thyroidectomies in which parathyroid tissue has been excised or injured. The third category of parathyroid disease—neoplasms—consists almost entirely of adenomas, as truly malignant tumors are exceedingly rare. Up to January, 1947 there had been 337 cases of adenoma reported. Those tumors which consist of oxyphil cells do not produce hyperfunction.

The classical symptoms and findings of osteitis fibrosa cystica and the more elusive manifestations of less severe hyperfunction are discussed. Four case reports are included. One of these deals at some length with a case of hyperfunctioning adenoma; the other 3 are concerned with other parathyroid disorders. BENJAMIN F. LOUNSBURY, M.D.

Myxoma, the Tumor of Primitive Mesenchyma. ARTHUR PURDY STOUT. *Ann. Surg.*, 1948, 127: 706.

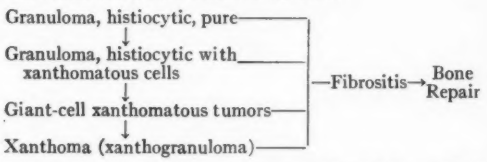
The author defines myxoma as a "true neoplasm composed of stellate cells set in a loose mucoid stroma through which course very delicate reticulin fibers in various directions." It resembles primitive mesenchyme and there are no recognizable differentiated elements. Growth is progressive and is both expansive and infiltrative. The tumor does not metastasize and, if it kills, it is because of damage to vital structures through compression or erosion. The author has found that it occurs about equally in males and females and in all ages from birth to old age, with greatest frequency in the fifth decade. Anatomically, it occurs most frequently in the heart, but it is also found in the skin and soft parts, bones, and genitourinary system. The fingers are most frequently involved when it is found in the skin; the mandible and maxilla are the most frequent bone sites, and most of the genitourinary cases present involvement of the bladder.

While the tumors are usually small, a tumor weighing over 5 kgm. was removed from the retroperitoneal space.

Roentgen-ray therapy has not proved to be successful and because of the infiltrative nature of these tumors limited excision of the apparent growth has resulted in recurrences. DANIEL RUGE, M.D.

A Proposition Concerning the So-called Xanthomatous Type of Giant Cell Tumors (A proposito de la llamada variedad xantomatosa de los tumores gigantocelulares). F. SCHAJOWICZ and S. MONDOLFO. *Rev. ortop. traumat.*, B. Air., 1947, 17: 34.

Giant cell tumors, according to Ewing, are divided into myxomatous, xanthomatous, telangiectatic, and those arising from cartilage. Evidence is produced in this article showing that the xanthomatous type of giant cell tumor is hyperplastic, belonging to the histiocytic bone granulomas. The authors consider the evolution of the tumor as follows:



For these reasons the tumor should be called xanthomatous histiocytic granuloma, or xanthogranuloma.

It is not possible to differentiate these tumors by roentgenography; they are, however, histologically distinct. Because of their granulomatous origin, they are benign and their prognosis is good following conservative treatment, which consists of curettement and filling the defect with bone chips. Postoperative radiotherapy is not necessary if curettement is thorough. STEPHEN A. ZIEMAN, M.D.

EXPERIMENTAL SURGERY

Renal Transplantation; Anastomosis with Nonmetallic Prosthesis (Transplantation rénale; anastomose par prothèse non métallique). JACQUES OUDOT. *Presse méd.*, 1948, 56: 319.

In his experiments on dogs, Oudot found that the best way to preserve the kidney between its removal and grafting was to immerse its vessels only in serum at 15° C. and to place the organ on a wet compress in a closed glass. He heparinized the donor to prevent coagulation and made the anastomosis to the external iliac vein armed with a nonmetallic prosthetic tube. Cutaneous ureterostomy is impractical because the animal tears off everything it can reach and the zone of implantation soon suppurates. It is therefore necessary to take recourse to ureteral reimplantation with or without vesical patching.

The factors which contribute to the success of renal transplantation include the choice of young male animals, the quality of the venous anastomosis (especially without torsion), reduction of the size of the external iliac artery by placing a catgut suture on it that is moderately tightened, fixation and position of the kidney in the iliac fossa without angulation of the vessels, heparinization, avoidance of pressure on the ureter, conservation of the longitudinal ureteral vessels, and avoidance of infection.

Oudot reports his results. In homogenous grafts, cutaneous ureterostomy is an easy operation, but the kidney stops functioning after 10 days; gradually the rate of urea and chloride decreases and histologic examination shows a suppurative necrosis which changes the aspect of the organ completely. Ascending infection is the cause of the changes. In ureterostomy the problem is complicated by the ureteral factor.

It is necessary to wait for about a month to learn whether the graft is functioning or not. Only after the 2 normal kidneys have been removed is it possible to know whether the operation has succeeded; and as one kidney is grafted at a time, this means that the animal must be submitted to four operations. This makes it a difficult experiment which often ends with a uremic animal. If extreme care is not taken, the kidney becomes infarcted and the lesions predominate in the medulla. On the other hand, there is often a calcareous deposit in the epithelial cells of the tubules. The only animal that Oudot followed up until its death had had a double graft of homogenous kidneys with vesical patching; it survived only 12 days, but the volume of urine remained high for 9 days with a good concentration of urea and chloride. Autopsy revealed anastomoses without thrombosis, and hydronephrotic and slightly infarcted kidneys with obstructed ureters.

In autogenous grafts, results were excellent provided that one kidney was normal from the beginning; it seems that the grafted kidney resumes its function only in the presence of a normal kidney. Afterward, the normal kidney can be removed in its turn and replaced on the iliac vessels. Oudot now has several animals which are living and in excellent condition on two transplanted kidneys.

RICHARD KEMEL, M.D.